College Enrollment, Graduation, and Financing: The Role of Parental Income and Wealth

by

Joshua Brimhall Rasmussen

Department of Economics
Duke University

Date: _____

Approved:

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V. Joseph Hotz, Supervisor

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Marjorie McElroy

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Duncan Thomas

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Seth Sanders

Dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy in the Department of Economics
in the Graduate School of Duke University
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Abstract

This dissertation explores the role of parents' financial resources in decisions made about college by parents and children entering adulthood and the consequences of those decisions for both parents and children. The second chapter examines the influence of parental wealth and income on children's college attendance and parental financing decisions, graduation, and the quality of college attended, as well as whether parental financing affects the subsequent indebtedness of parents and children. The results show that higher levels of parents' wealth and income increase the likelihood that children attend college with financial support relative to not attending college, and that parental wealth increases the likelihood that children graduate from college. There is descriptive evidence that parental support for college increases the subsequent level of housing debt that parents hold but does not reduce student debt for children.

Chapter 3 explores difference by race in the effects of parental wealth and income on college enrollment, financing, and graduation, against the backdrop of racial disparities between black and white families in wealth, income, and college outcomes. I find evidence of significant black-white differences in the effects of parental income and housing wealth. Higher levels of income raise the probability of college enrollment for children of white parents but not black. Conversely, increases to housing wealth raise the likelihood of enrollment only for black children. Increases to parental wealth and income increase the likelihood that white parents offer financial assistance

to their children for college by similar amounts. There is no effect of wealth on the likelihood of financial transfers for black parents, but a large effect of income for black parents relative to white ones. I also find racial differences on graduation. I find a small but positive effect of increases in parental income on the likelihood of graduation from college for white children. For black children, I find no effect of income on graduation, but my results indicate that a one percent increase in parental income raises the likelihood of graduation by between 0.60 and 1.18 percent.

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1

Introduction

This dissertation develops a common data set and methodology to attempt to answer two very different sets of research questions in Chapters 2 and 3. Though stemming from different literatures, these chapters explore the role of parents' income and housing wealth in decisions made by parents and their children entering adulthood about college—including whether and what type of college to enroll in, as well as how to finance it—and the consequences of those decisions with respect to eventual attainment and subsequent indebtedness.

Both chapters make use of the Panel Study of Income Dynamics (PSID) as the foundation of their analysis samples. The PSID tracks respondents and their descendants over time, allowing for the identification of households with children who entered adulthood and faced the decision of whether or not to attend college between the years of 1998 to 2013. The structure of the PSID allows me to observe the circumstances of parents and their children in the period just preceding the child entering adulthood and choosing whether to enroll in college, observe their choices about enrollment and financing of college, and observe the financial circumstances of both parents and children several years subsequent to the child entering adulthood.

I make use of data collected by the PSID on family wealth, especially information on the value of the family's home and any mortgage or home equity loan debt, family income, and other measures of debt for both parents and children, student loan debt in particular. A key component of the data sample used in both chapters is a set of measures from the Rosters and Transfers Module from the 2013 PSID wave. In this module, all parent respondents were asked about the financial help, in the form of transfers, they provided to each of their adult children, as well as the educational attainment of each child (Schoeni et al., 2015).

Both chapters 2 and 3 seek to identify causal relationships between parental resources—in the form of income and housing wealth—and the choices made by families with respect to college. To instrument for the potential endogeneity of parental income and housing wealth, measures are constructed using changes to parents' local labor and housing market conditions. To my knowledge, these chapters are the first attempts to consider parental income and wealth effects jointly with respect to college attendance and financing. Chapter 2, in joint work with V. Joseph Hotz, Emily Wiemers, and Kate Maxwell Koegel, we follow the impact of changes to parental income and housing wealth through different periods in the life cycle. We start by examining the effect of changes to parents' resources in the years just preceding their child's 18th birthday on the likelihood the child attends college, as well as the likelihood (and amount) of parental financial assistance in paying for college. We next examine the effect of parental housing wealth and income on the quality of college children attend, as well as the likelihood that children graduate. Finally, we consider the consequences of parental financing decisions for the subsequent debt of parents and children. We find that increases in parents' income and wealth raise both the likelihood of children attending college and receiving parental transfers to help finance their education. We further find that changes to income have a larger effect on enrollment than changes to housing wealth. We find that increases to parental

wealth increase the likelihood that children graduate from college, but find no similar effect for income. Finally, we find suggestive evidence that financial transfers from parents to children for college increase the subsequent indebtedness of parents, but does not reduce the student debt of their children.

Chapter 3 places these issues in the context of stark racial disparities in the US with respect to education, income, and wealth. Black individuals are less likely to enroll in college or graduate from college than white students (DeAngelo et al., 2011; McFarland et al., 2018). As parental wealth and income has been linked to a multitude of educational outcomes—including the likelihood a child enrolls in college (Jez, 2014; Lochner and Monge-Naranjo, 2011, 2012) as well as the likelihood of graduation (Conley, 2001)—some of the differences in college outcomes may be explained in part by the presence of racial wealth and income inequality.

I identify black-white differences in the effect of changes in parental housing wealth and income on college enrollment, financing, and attainment. I find that increases to parental income raise the likelihood of college enrollment for children of white parents, but not for children of black parents. Instead, I find a smaller positive effect on enrollment for black families from increases to parental housing wealth. Increases to parental income and wealth both raise the likelihood of financial transfers from white parents to children to help pay for college. Only increases to parental income increase the likelihood of financial transfers for black parents, with an effect size approximately twice as large as the effects of both income and wealth for white parents. These findings indicate differences in the propensity or ability of black parents to utilize housing wealth to help finance college for their children, relative to white parents. These differences persist after enrollment. I find a very large positive effect of increases to parental income on graduation for children of black parents, but no effect of income for children of white parents. White families

experience much smaller positive effects on the likelihood of graduation of increases in parental income.

2

The Role of Parental Wealth & Income in Financing Children's College Attendance & Its Consequences

Joint with V. Joseph Hotz[1], Emily Wiemers[2], and Kate Koegel[3]

2.1 Introduction

Parents have long been a primary source of financial support for their children's post-secondary education with some estimates suggesting that parents cover over 30% of college costs.[4] In this paper we analyze the role that parental resources play in whether children attend college and whether parents provide financial support, the quality and cost of the college they attend, and whether they graduate, and the implications of college financing decisions for subsequent levels of parental and student debt. The dramatic increases in the costs of a college education in the U.S

[1] Duke University, NBER & IZA

[2] University of Massachusetts Boston

[3] Duke University

[4] Based on a survey of college students and their parents in 2017, parents cover 31% of the cost of their child's college costs, second only to costs covered by scholarships and grants (35%) (SallieMae, 2017).

over the past 30 years[5] have challenged the ability of parents and children to finance a college degree and decisions about college financing may have long-run impacts on the financial circumstances of both parents and children.

Previous research has focused on the impact of parental resources on their children's college attendance. Earlier work found little evidence that parental income had an independent effect on the likelihood of young adults attending college, especially after accounting for children's ability and academic preparation (Cameron and Heckman, 1998, 2001; Keane and Wolpin, 2001; Cameron and Taber, 2004). But, more recent research documents that the relationship between parental income and the college attendance decisions of children has changed over time, with parental income more likely to be predictive of children going to college, even after controlling for the ability and/or academic preparation of children (Belley and Lochner, 2007; Lochner and Monge-Naranjo, 2011, 2012).

Other studies have examined the impact of parental wealth, most notably housing wealth, on college attendance and other outcomes for young adults (Belley and Lochner, 2007; Lovenheim, 2011; Lovenheim and Reynolds, 2013). Lovenheim (2011) finds that increases in housing wealth during a child's teenage years increase the probability that the child attends college and that these effects are larger after 2000 when home equity loans became more common. Lovenheim and Reynolds (2013) show that among children who go to college, increases in parental housing wealth increase the likelihood of their child attending a flagship public university and that children from low-income families are more likely to complete college. Finally, Cooper and Luengo-Prado (2015) show that children of homeowners who live in areas where house prices increased during a child's teenage years are more likely to enroll in college and attend higher ranked colleges, though they are not more likely to graduate.

[5] Since 1987-88, published college tuition costs (tuition & fees), adjusting for inflation, have increased an average of 8.8% per year in public 4-year institutions, 4.4% in non-profit private 4-year universities, and 4.0% in public 2-year colleges (College Board, 2017).

The premise underlying these papers, and the models of parents' investment in their children's human capital in the presence of credit constraints that motivate them, is that parents use their resources – both income and wealth – to finance their children's college attendance (Keane and Wolpin, 2001; Lochner and Monge-Naranjo, 2011, 2012). There also is a sizable literature on the importance of student loans[6] and grants-in-aid[7] in funding college education. It is also well-documented that the debt that students accumulate while attending college persists long after they complete or stop attending college and affects their subsequent labor market choices (Rothstein and Rouse, 2011) and their ability to finance housing and other activities (Mezza et al., 2015; Cooper and Wang, 2014; Bleemer et al., 2017).

However, much less is known about how parents' financing of their children's education affects the subsequent financial situations of parents and children, especially with respect to their respective indebtedness. Two notable exceptions are **?** who show that parental financial transfers reduce student debt repayment problems in the Canada Student Loan Program, and, Faber and Rich (ming) who show that commuting zones that experienced increases in the rate of college attendance had increases in home foreclosures in subsequent years. Both of these papers highlight important interactions between parental financial support for college and subsequent financial outcomes of both parents and children.

We address three related issues concerning parent's investments in their children's human capital and the consequences of how these investments are financed. First, we examine how both parental income and wealth, as measured by housing wealth, affect the likelihood that children go to college and how this investment is financed.

[6] Since 2004, the share of undergraduate students who have taken federal subsidized and unsubsidized student loans has increased from 28% in the 2004-05 academic year to 36% in 2014-15, with a decreasing share of students only having subsidized loans (College Board, 2015).

[7] In terms of such grants, in 2015, colleges and universities provide 41% of such aid, 37% from federal sources, 14% from employers and private sources, and 8% coming from state governments (College Board, 2015).

This issue is similar to that addressed in Lovenheim (2011) and Lovenheim and Reynolds (2013), who examine the effects of housing wealth on whether or not their child attends college and whether they attend the flagship university in their state-of-residence. We extend this analysis to examine how both housing wealth and parental income affect not just the attendance decision but also whether parents help pay for their child to go to college. This extension provides an explicit analysis of the link between parental resources and the educational decisions of children that is implied by earlier work. And, we also extend the previous literature by analyzing the effect of both parental wealth and income on college attendance and financing decisions which we show to be important.

Second, we examine the effect of parental housing wealth and income on the likelihood that children graduate from college and the cost or quality of the college children attend. It is well-documented that while college attendance has increased in the U.S., graduation rates have not (Bound et al., 2010; Bound and Turner, 2011). And graduation rates are quite low; among individuals who began seeking a bachelor's degree at a 4-year institution in the U.S. in the fall of 2009, only 59% completed that degree within 6 years (McFarland et al., 2017). Thus, it is important to assess whether higher levels of parental wealth and income not only increase the likelihood that children attend college but also graduate from college.[8] In addition, there is a sizable literature on differential returns aross the type of college students attend, including 4-year versus 2-year institutions (Kane and Rouse, 1995), public versus private colleges (Scott et al., 2006) and, more generally across measures of college quality including the selectivity of admissions and quality of faculty (Black and Smith, 2004, 2006; Black et al., 2005; Dillon and Smith, 2017b). Accordingly,

[8] We note that previous work using the PSID by Cooper and Luengo-Prado (2015) find that increases in parental housing wealth increase the income of children as adults, has not found any effects of parental wealth on college completion.

we examine whether parental wealth and income improves the "quality" of college that children attend.

Third, we consider the consequences of the parental financing decision for the subsequent debt of parents and children. As noted above, a great deal of attention has been paid to the rising levels of student loan debt and its subsequent consequences in young adulthood, irrespective of whether students complete a degree. But parents, too, take on debt to help finance their child's college education[9] – often in the form of home equity loans using their housing wealth as collateral – and their debt also is likely to persist well after the child has completed college. While taking on debt to finance a college education may be an efficient way of financing college costs in the presence of well-functioning capital markets, it does expose borrowers to the repayment risks arising from uncertain future income streams and/or unanticipated fluctuations in the value of their collateral. In examining how parental decisions to help finance their children's college education affects their and their children's later indebtedness, we ask whether parental financial support for college reduces students' debt even as it increases their own.

To address these three issues, we use data from the 2013 Panel Study of Income Dynamics (PSID) and the Roster and Transfers Module which obtained information from all parents in the PSID on the financial help (transfers) they provided to each of their adult children for education and on the educational attainment of each adult child (Schoeni et al., 2015). We also exploit the data collected in the PSID on family wealth and debt, especially with respect to the value of the family's home and what they owe in debt on mortgages, and the debt of their children, especially in the form of student loan debt.

[9] Based on the 2017 survey cited in footnote 4, 27% of students' college costs were financed by loans, with 30% taken by parents and 70% by the student.

A key issue is the extent to which parental resources, either in the form of income or housing wealth, have a causal impact on college attendance and financing decisions, or on the subsequent financial situations of parents and their children. For example, an association between parental housing wealth and children's college attendance and financing may simply reflect sorting across families with respect to unobserved parental preferences for higher education and their own earnings capacity as well as the earlier investments in and unobserved traits (e.g., abilities) of children. To address this issue, we construct measures of changes in local housing and labor market conditions to use as instruments for parental housing wealth and income at various points in their life cycles, as well as the income of their children in early adulthood. This strategy extends previous work (Lovenheim, 2011; Lovenheim and Reynolds, 2013; Cooper and Luengo-Prado, 2015) which uses data on local housing conditions to measure the effects of housing wealth on college attendance decisions.[10] The detailed geographic information included in the PSID makes it possible to incorporate data on local labor and housing markets to identify plausibly exogenous changes in parental resources and examine the effect of these changes in parental income and wealth on transfers parents make to fund their children's college education. At the same time, we note that obtaining causal effects of whether or not parents finance their children's college education on the subsequent indebtedness of both parents and children is more challenging, even with the instrumenting strategy described above. As a result, we view the findings we present below as suggestive –

[10] Our approach is also in the spirit of the literature on the effects of changes in wealth and income on household consumption. See, for example, Paiella and Pistaferri (2017), Browning et al. (2013), and Carroll et al. (2011) for analyses of the effects of changes in housing wealth on consumption. Though we do not use changes in housing wealth and income as explanatory variables, we do use changes in wealth and income from sources that are less likely to be endogenously determined as a way to identify the effects of housing wealth and income on college attendance and financing decisions. Unlike the literature on the effects of changes in wealth and income on consumption, which pays particular attention to distinguishing between permanent and transitory changes in wealth and income, we do not attempt to explicitly disentangle these effects in our analysis.

rather than definitive – of the causal links between parental financing decisions and subsequent indebtedness.

We find that increases in parents' income and wealth increase the likelihood of children attending college through the mechanism of parental transfers. But, increases in parental income have a larger effect on college attendance than increases in parental wealth. In contrast, increases in parental wealth increase the likelihood that children graduate from college but we find no effect of increases in parental income on college graduation. We find evidence that the importance of parental wealth on college graduation is explained by parent's obtaining home equity loans when their child starts college. We find that neither parental income or wealth affects indicators of the type (e.g., 4-year vs. 2-year or private vs. public) or the quality of colleges children attend though sample sizes are reduced in these specifications due to data availability. Finally, we find suggestive evidence that parental financing of college increases parents' subsequent indebtedness and but little evidence that it reduces their children's student debt.

The remainder of the paper is organized as follows. In Section 2.2 we describe the PSID data and the samples and measures we use in our analyses. In Section 2.3, we consider the effect of parental income and wealth in children's college attendance and parental financing decisions. In Section 2.4, we examine how parental income and wealth affects the likelihood of their child graduating from college and the quality and type of school the child attends. Finally, in Section 2.5, we consider the correlation between children's college attendance and parental financing decisions and the subsequent indebtedness of parents and their children. We offer concluding comments in Section 2.6.

2.2 The PSID Data

The PSID began with a sample of roughly 18,000 people in approximately 5,000 household units in 1968. All individuals in households recruited into the PSID in 1968 are said to have the PSID gene. Individuals who are born to or adopted by someone with the PSID gene acquire the gene themselves and are recruited to become members of the PSID sample for the rest of their lives. This genealogical design implies that the study provides data on a sample of extended families at each wave. The extended family in the PSID is incomplete because some children (particularly stepchildren and children who have left the PSID sample), and some parents (for example in-laws without the PSID gene) are not included in the sample. The 2013 Roster and Transfers Module was designed to complete the parent-adult child information in the PSID and to describe the transfers that parents and adult children make to one another.

2.2.1 The 2013 PSID Roster and Transfers Module

We use the Roster and Transfers Module of the 2013 PSID in which respondents (PSID heads and spouses) are asked to list and describe their adult children and stepchildren age 18 and older, as well as their parents, stepparents, and in-laws (including in-laws from long-term cohabiting relationships) and to report about financial and time transfer to and from their parents and adults children. Importantly for our purposes, parents report about the age and educational attainment of their adult children and about financial transfers for school they have given to each of their children since the age of 18. Both whether assistance was provided and the amount of assistance is included in the module. Respondents report about relationships and transfers with coresident and non-coresident children (see Schoeni et al. (2015) for a more complete description of the module).

2.2.2 Samples

Our sample starts with the parents and adult children reported in the 2013 Roster and Transfers Module. We are interested in two points in the lives of these adult children: the year in which the child turns 18 when decisions about college are made, and the year in which the child turns 24 when some of the consequences of financing college can be observed.

To create our main sample, we find the year in which the child turned 18 using the birth year in the Childbirth and Adoption History augmented by age reported in the Roster and Transfers Module. Using the Parent ID file augmented with the relationship information in the Roster and Transfers Module, we link each child with his or her father and mother. Because we need to determine the parents' housing wealth and household income at this point in the child's life, we restrict our sample of parent-child pairs to those in which the parents were present as a head or wife of the PSID in the year this child was age 18.[11] We also require that the year in which the child turned 18 is after 1997 (which corresponds to children in birth cohorts beginning in 1979) since some of the data elements we need in our analyses are only available starting in 1997.[12] We further restrict our sample to those parents who were homeowners when the child was age 18, because of our focus on the effects of parental housing wealth on children's college attendance and financing decisions.[13] Finally, following Lovenheim (2011) we trim the top 1% of changes in house prices

[11] If the parents are not a PSID head or wife in the year in which the child turns 18 we go back one year at a time until the child age 13 at which point we drop the child-parent pair.

[12] The housing price measure from Zillow which we used to construct a measure for changes to local housing markets had inadequate geographic coverage prior to this period.

[13] This restriction reduces our sample by approximately 35%. While not included in the paper, we estimated versions of the empirical models described below that included parents who were not homeowners at the time their child(ren) were age 18, adjusting for the fact that we could not estimate the effects of their home equity but could estimate the effects of their income on the college and financing decisions for their children. The resulting estimates of the effects of parental income on these decisions when one included non-homeowning parents were similar to those we present below based on homeowning parents.

prior to the child turning 18 which removes 14 parent-child pairs. After all of these sample selections, we have a sample of $N = 2{,}868$ parent-child pairs with which to estimate the effect of parental wealth on college attendance and parental transfers for college.

To examine the consequences of college attendance and financing decisions on educational and financial outcomes, we examine the parent-child pairs in our main sample in the year in which the child turns 24. This limits the sample to parent-child pairs in which the child turned 18 prior to 2009.[14] For the outcome of parental debt, this restriction yields a sample size of 2,580 for housing debt and 2,571 for non-housing debt that includes credit card debt, and auto loan debt. For the outcome of college completion, we further limit the sample to children who attended college which yields a sample size of 1,418 parent-child pairs.

Measures of college quality and child indebtedness are only available for two subsamples of children: (a) those who are a PSID head or wife by age 24 or (b) those who are members of their parents' household at age 24 but are interviewed as part of the Transition to Adulthood (TA) study. The TA study has followed children in the PSID's Child Development Study (CDS) as they become adults. The TA study includes questions about which college children attended as well as information on income and debt. Using these two sources of data, we construct a total sample of 1,756 adult children with which to analyze their non-housing debt at age 24 and 1,196 with which to analyze student loan debt at that age. We have a smaller sample of children to analyze student debt at age 24 because the PSID only started asking about this source of debt separately in 2011. For the outcomes of college cost and quality, we further limit the sample to children who attended college and whose college can be linked to the data from the National Center for Education Statistics (NCES)

[14] If the relevant data are not available for the child or parent in the year in which the child is age 24 we go back one year at a time until the child is age 22 and forward one year at a time until the child is 27.

Integrated Postsecondary Education Data System (IPEDS) database which yields a sample size of 856 for tuition and 854 for four-year degree status. Public/private status of the college and our measure of college quality which we construct from the IPEDS data are only available for children who attend a four-year college which limits our sample to 704 for public/private college status, and 705 for college quality.

Table 2.1 provides a summary of the sizes of these various samples that we use in our analysis below. In A.1, we also present descriptive statistics of the demographic characteristics of the parents and children, measured at the time the children were age 18, of the sample of the 2,866 parent-child pairs used in our analysis of college education decisions.

Table 2.1: Sample Sizes

Samples	N
Parent-Child Pairs for Analyses of:	
Child's College Choices ($EduFin0$, $EduFin1$, $EduFin2$) & Amount of Transfer	2,866
Whether Child Graduated from College	1,418
College Tuition Costs, Conditional on Attending	856
Whether Child attended 4-year College, Conditional on on Attending	854
Whether attended Private College, Conditional on attending 4-Yr College	704
College Quality Index, Conditional on attending 4-Yr College	705
Parent-Child Pairs when Child at age 24 for Analyses of:[1]	
Parents' Mortgage Debt	2,580
Parents' 'Other' Debt	2,571
Children's 'Other' Debt	1,756
Children's Student Loan Debt	1,196

[1] Data on the debt of children at or near when they are age 24 is obtained from either the regular PSID survey or from the the Transition to Adulthood (TA) survey which covers children who are age 18 or older regardless of whether they have become the head of their own household.

2.2.3 Measures

Below we describe how we construct the various measures used in our analyses. In later sections, we provide summary statistics.

College Attendance and Graduation: We measure college attendance and college graduation using the Roster and Transfers data. We consider a child to have at-

tended college if the parents report in the Roster and Transfers data that the child has attended some college or has a college degree. This measure is somewhat different from the previous literature (Lovenheim, 2011; Lovenheim and Reynolds, 2013; Cooper and Luengo-Prado, 2015) which uses the annual PSID data to determine enrollment. The benefit of the measure from the Roster and Transfers data is that is considerably easier to identify students who enroll in but do not complete college. This is important to understanding the potential difference in effects of attending vs. graduating from college. We measure college graduation by a parental report that the child's highest level of educational attainment is college graduate or more.

Financial Transfers for College: Parents are considered to have given a financial transfer to a child for educational expenses if they report having done so in the long-term transfers question in the Roster and Transfers Module. We eliminate the small number of cases in which parents report that their child has educational attainment below "some college" and report having given a transfer for post-secondary educational expenses. We measure the amount that parents report giving to their child in 2013$.[15]

College Cost and Quality: We link responses from the main PSID interview or the TA study on the college attended to measures of college cost and quality available from the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) database. We obtain the annual tuition costs for a full-time student at that institution in the year they would have started college. In doing so we use the state of residence of the parent at that time to determine whether

[15] We note that the decision to measure the amount of transfers in 2013$ is not straightforward. Though parents were asked the question on amounts of transfers in 2013, it is not clear whether the reported amounts in terms of current dollars or the dollar value(s) at the time the transfers were made. We have re-run our specifications of regressions for the effects of parental housing wealth and income on the amount of transfers given to support a child's college education under either of these two assumptions about parental reporting. While the magnitudes of the corresponding coefficients differed, none of the inferences we make below were affected. Accordingly, we only present results under the assumption that parents reported the amounts of these transfers in current (2013) dollars.

children would have paid in-state or out-of-state tuition at any public institutions.[16] For college quality we use three separate measures. First, we measure whether the institution grants 4-year degrees. Second, we use whether a child attended a private university, where we restrict our attention to students who attend a 4-year university. Finally, we use the college quality index used in Black and Smith (2004), Black et al. (2005), Black and Smith (2006), Dillon and Smith (2017b), and Dillon and Smith (2017a).[17] The index is based on the following measures of colleges' selectivity and resources: college's mean SAT or ACT scores; percent of applications rejected; average salary of faculty involved in instruction; and the undergraduate faculty-student ratio.[18] The index is the first principal component of these four indicators of college quality measured in 2008.[19]

Parental Housing Wealth and Income: Over the entire span of the PSID, heads of households or their proxy are asked whether they are a homeowner and, if they are, to provide an estimate of the value of their home and the remaining balance, if any, on their home mortgages and/or home equity loans. Mortgage debt includes all primary and secondary mortgages, along with home equity loans and lines of credit on the individual's primary residence. Then, we define an estimate of the parents net home equity as the reported market value of their home less any remaining mortgage balances. Parental income is measured by total family income reported in the annual PSID family data.

[16] We use in-state tuition if the parents resided in the same state as the institution in the year the child turned 18, and out-of-state tuition otherwise.

[17] We thank Nora Dillon and Jeff Smith for providing us with the latest version of these quality indices for 4-year and 2-year colleges in the U.S.

[18] These dimensions of quality for colleges in the U.S. are obtained from the Integrated Post-Secondary Education Data System (IPEDS) and college rankings by *U.S. News & World Report*.

[19] The particular version of college quality index we use takes on values from -9 to $+9$ and is constructed to have a mean of 0 across all of 4-year colleges and universities in the U.S.

Parental and Child Indebtedness: We consider several forms of indebtedness for both parents and their children. For parents, we consider mortgage debt, the sum of all their primary and secondary mortgages along with home equity loans, and all other non-housing debt, including outstanding credit card and medical debt, as well as other outstanding loans. These measures are obtained in the PSID wealth module which has been included in every survey since 1997. For children, we examine debt in the form of outstanding student loans, as well as total other non-housing debt. Student loan debt is obtained from the TA survey and from the PSID wealth module after 2011. Total non-housing debt is measured in the TA survey and in the PSID wealth module.

2.3 Effects of Parental Wealth & Income on Children's College Attendance and Its Financing

In this section we examine children's college attendance decisions and parents' role in helping to finance their children's choices. In particular, we are interested in how changes in parents' wealth and income affect these choices. We begin by defining the notation for college attendance and parental financing thereof as well as parental income and housing wealth and discussing the empirical distributions of parental wealth and income across college attendance and financing decisions in our sample. We then describe our econometric strategy for estimating the causal impact of parental wealth and income on the decision of children to attend college and the decision of parents to help pay for it and discuss our empirical findings.

2.3.1 Modeling Children's College and Parental Financing Choices

We define the following variables to characterize the college attendance and parental financing decisions for the j^{th} child of the i^{th} parent when the child is

age 18:

$$EduFin0_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ did } \textit{not} \text{ enroll in college,} \\ 0, & \text{otherwise.} \end{cases} \tag{2.1}$$

$$EduFin1_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ enrolled in college \& parents didn't help pay,} \\ 0, & \text{otherwise.} \end{cases} \tag{2.2}$$

and

$$EduFin2_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ enrolled in college \& parents did help pay,} \\ 0, & \text{otherwise.} \end{cases} \tag{2.3}$$

where $EduFin0_{ij,18_j} + EduFin1_{ij,18_j} + EduFin2_{ij,18_j} = 1$.

Conditional on $EduFin2_{ij,18_j} = 1$, we can measure the *amount of financial help* parent i provided to child j in support of the child's college attendance. Denote this amount as $CollTrans_{ij,18_j}$.

Table 2.2 shows the distribution of $EduFin$. In our sample, 44% of children do not enroll in college, 30% enroll but do not receive financial help from parents and 26% enroll in college with a transfer from a parent. The mean amount of the transfer is $7,800.

Table 2.2: Child's College Enrollment Choices & Parental Transfers for College among Homeowning Parents & College-Age Children in PSID, 1997-2015[1]

Variable	Mean
Child's College Enrollment Choices:	
Child does not enroll ($EduFin0$)	0.44
Child enrolls, no transfer ($EduFin1$)	0.30
Child enrolls, transfer ($EduFin2$)	0.26
Amount of Transfer ($CollTrans$)[2]	\$0.78

[1] Statistics weighted using PSID family weights.
[2] Conditional on those students who attended college at age 18. Dollar amount is in 10K of 2013\$.

As noted above, we focus on how parental housing wealth and parental income influence these decisions. To begin, we characterize the housing measures we construct from the PSID data. Let $MktValue_{imt_{18,j}}$ denote the *parents' estimated market value of their home* (measured in 2013 dollars) located in market m (which is in state s) in the year in which child j was age 18 (t_{18_j}). Further, let $MortBal_{imt_{18_j}}$ denote the remaining balances on parents' home mortgages and home equity loans as of year t_{18_j}, again in 2013\$. Then, we define an estimate of the parents *(net) home equity* as:

$$H_{imt_{18_j}} = MktValue_{imt_{18_j}} - MortBal_{imt_{18_j}}. \tag{2.4}$$

Let $Y_{imt_{18_j}}$ denote the parent i's *total household income* in year t_{18_j} when they were residing in local labor market m.

In Table 2.3 we display how parental housing wealth, $H_{imt_{18_j}}$, and annual income, $Y_{imt_{18_j}}$, differ by college attendance and parental financing decisions. The patterns of parental net equity and income across college attendance and financing decisions are predictable. The parents of children who attend college without financial support have \$21,200 [$= \$50,200 - \$29,000$] more in net home equity and \$22,300 [$= \$75,100 - \$52,800$] more in income when their child is age 18 compared to the

parents of children who do not attend college. The parents of children who attend college with financial support have $63,400 more in net home equity and $45,200 more in income than those whose children attend college without parental financial help.

Table 2.3: Parents' Net Equity, Parental Income by College Attendance and Parental Financing when Child was Age 18[1]

	Full Sample	$EduFin0$ (No Coll)	$EduFin1$ (Coll, but No Transfer)	$EduFin2$ (Coll & Transfer)
Parents' Net Equity ($H_{imt_{18_j}}$)	$5.73	$2.90	$5.02	$11.36
Parents' Income ($Y_{imt_{18_j}}$)	$7.69	$5.28	$7.51	$12.03

[1] Statistics weighted using PSID family weights. Dollar amounts are in 10K of 2013$.

To model parental-child college and financing decisions, let the utility/payoff for $EduFink_{ij,18_j}$ be denoted by $U^*_{kijm,18_j}$ and assume that choice $k = 0$ is the base category. The payoff functions for parent i of child j made when the child is age 18 are given by:

$$U_{kijm,18_j} = \lambda^U_{k0} + \lambda^U_{k1} H_{imt_{18_j}} + \lambda^U_{k2} Y_{imt_{18_j}} + \boldsymbol{\lambda}^U_{k3} \boldsymbol{X}_{ij} + \boldsymbol{\lambda}^U_{k4} \boldsymbol{M}_{mt_{18_j}} + \phi^U_{kt_{18_j}} + \delta^U_{ks} + \varepsilon^U_{kijm,18_j}, \tag{2.5}$$

for $k = 0, 1, 2$, where the $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are defined above, $\boldsymbol{X}_{ij}$ is a vector of demographic characteristics of parents i and their j^{th} child, $\boldsymbol{M}_{mt_{18_j}}$ is a vector of time-varying characteristics of location m in year t_{18_j}, $\phi_{t_{18_j}}$ and δ_s are year and state-of-residence *fixed effects*, respectively, and $\varepsilon_{kijm,18_t}$ are choice-specific unobserved parent and child traits.

We include in $\boldsymbol{X}_{ij}$ a set of demographic characteristics including the age, marital status, race, and education of the parent. Also included are a set of variables describing the family structure of the child's household at age 18 including whether the household is headed by a single-female, the number of children in the household

under age 16, whether there is a child in the household who is less than five years older than child j, whether there is a child in the household who is less than five years younger than child j, and the gender of child j. (See A.1 for the list of these variables and their sample means.)

We include in $\boldsymbol{M}_{mt_{18_j}}$ the average weekly wage and employment rate in market m in year t_{18_j}, where the latter variables are taken from the Quarterly Census of Employment and Wages (QCEW). We use a share-weighting approach to make the average weekly wage more accurately reflect the labor market teenage workers would face if they do not attend college. We use the Current Population Survey to calculate the composition of industries that teenagers are employed in nationally in each year and apply these weights to local industry-specific wages. We also control for the college-wage premium for younger workers directly. Following Lovenheim and Reynolds (2013) we use data from the Current Population Survey to calculate the college-wage premium for young workers in the state, s, in which market m is located in year t_{18_j} as the ratio of hourly wages of 25 - 40 year olds with a bachelor's degree (BA) to the hourly wages of 25 - 40 year olds whose highest level of educational attainment is a high school diploma. We also include the college - associate degree wage premium calculated as above but using individuals with an associate's degree as the comparison group. As long as high-skilled labor demand is not highly localized, these state-level measures control for the demand for high-skilled vs. low-skilled labor for younger workers.

We characterize the optimal college/financing choice for child j, $k^{\dagger}$, as follows:

$$k_i^{\dagger} = \arg\max_k U_{kijm,18_j}, k = 0, 1, 2. \tag{2.6}$$

Assuming that the random variable, $\varepsilon^U_{kijm,18_j}$, has a Type II extreme value distribution and assuming that we treat $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ as exogenous to child j's college

enrollment and parental financing decisions, it follows that the model of the college attendance and its financing choice can be estimated as a multinomial logit model.

As noted in the Introduction, the assumption that $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are exogenous is a strong one. Accordingly, we wish to allow for the potential endogeneity of these two variables in the estimation of the payoff functions in (2.5). To deal with the endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$, we use a control function estimator (Blundell and Powell, 2003) applied to the multinomial logit specification (Petrin and Train, 2010; Wooldridge, 2014). This estimator can be implemented in two stages. In the first stage, we regress the endogenous variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ on exogenous regressors, including the exogenous variables, $\boldsymbol{X}_{ij}$ and $\boldsymbol{M}_{mt_{18_j}}$ in (2.5) and year and state-of-residence fixed effects, as well as a vector of instrumental variables, $\boldsymbol{Z}_{imt_{18_j}}$ (which we define in the next section) to account for the endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$. That is, these first-stage regressions are:

$$H_{imt_{18_j}} = \boldsymbol{\pi}_1^H \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}_2^H \boldsymbol{X}_{ij} + \boldsymbol{\pi}_3^H \boldsymbol{M}_{mt_{18_j}} + \phi_{t_{18_j}}^H + \delta_s^H + \nu_{imt_{18_j}}^H, \quad (2.7)$$

$$Y_{imt_{18_j}} = \boldsymbol{\pi}_1^Y \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}_2^Y \boldsymbol{X}_{ij} + \boldsymbol{\pi}_3^Y \boldsymbol{M}_{mt_{18_j}} + \phi_{t_{18_j}}^Y + \delta_s^Y + \nu_{imt_{18_j}}^Y, \quad (2.8)$$

One then retrieves the residuals from these regressions, which we denote as $\widehat{\nu}_{imt_{18_j}}^H$ and $\widehat{\nu}_{imt_{18_j}}^Y$, respectively. In the second stage, we estimate a multinomial logit model where we include $\widehat{\nu}_{imt_{18_j}}^H$ and $\widehat{\nu}_{imt_{18_j}}^Y$ as additional regressors, with separate coefficients, in the payoff functions in (2.5). To account for the estimation error in $\widehat{\nu}_{ijmt_{18_j}}^H$ and $\widehat{\nu}_{ijmt_{18_j}}^Y$ and the quasi-ML nature of estimation in the second stage, we adjust the estimation of the variance-covariance matrix of the λs as characterized in Wooldridge (2014). We use bootstrap to calculate these standard errors.

Finally, conditional on $EduFin2 = 1$, we can estimate the impacts of parental housing wealth and household income on the amount of the parents' transfer, $CollTrans_{imt_{18_j}}$. Mimicking the specification of payoffs in (2.5), we estimate the following OLS regres-

sion:

$$CollTrans_{imt_{18_j}} = \lambda_0^T + \lambda_1^T H_{imt_{18_j}} + \lambda_2^T Y_{imt_{18_j}} + \boldsymbol{\lambda}_3^T \boldsymbol{X}_{ij} + \boldsymbol{\lambda}_4^T \boldsymbol{M}_{mt_{18_j}} + \phi_{t_{18_j}}^T + \delta_m^T + \varepsilon_{imt_{18_j}}^T \tag{2.9}$$

where all of the control variables are the same as described above but we use MSA level fixed effects for urban residents and state level fixed effects for rural residents instead of state-level fixed effects. To account for the potential endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ in (2.9), we employ an instrumental variables estimator (2SLS), using the same vector of instruments, $\boldsymbol{Z}_{imt_{18_j}}$, used in the control function estimator of the parameters in the payoff functions in (2.5) which we describe next.

2.3.2 Instrumental Variables: Changes in Local Housing Prices & Wages

As noted above, we seek to instrument for parent's housing wealth, $H_{imt_{18_j}}$, and income, $Y_{imt_{18_j}}$, in the estimation of the payoff functions for the college education and financing choices parents make for their jth child. In this section, we describe the variables we use as instruments (Z) in our analyses and how they are constructed.

We use changes in local housing market prices and changes in labor market wages as our instruments. In particular, we construct measures of the change in the parents' housing wealth and parental income immediately before child j reaches age 18 to serve as instrumental variables for parental housing wealth and income in the estimation of our college attendance and financing models and our estimation of the effects of these decisions on subsequent educational outcomes described in Section 2.4. In spirit of the approach in Lovenheim and Reynolds (2013), we use changes in market-level measures of average housing values in the local market in which parents resided in the year in which the child was age 16, i.e., in year t_{16_j}. We use lagged values of changes in local market conditions for two reasons.

First, we want to to avoid the possible endogenous decision that parents may make to move to a different locality (market) at the time of their child's college decision, possibly to improve either their ability to finance the costs of college, e.g., they sell a more expensive home, take the equity from that home to pay for college and move to a less expensive home, or to reduce the cost of the college their child may attend, e.g., moving closer to a college or to a state that charges lower tuition.

Second, one might expect that parents base their assessment of whether they can use the equity in their home as collateral for a loan to pay for their children's college education (via a home equity loan, for example) based on any changes in local housing values one or two years prior to the actual decision, rather than based on what happens to housing values in the year when their child would be going to college. We note that this strategy of using changes in local housing values a few years prior to the child's college decision is similar to the one used by Lovenheim (2011) and Lovenheim and Reynolds (2013) in their studies of the effects of parental housing wealth on children's decisions to attend college. Finally, we note that we use the same strategy when constructing measures of the changes in local labor market conditions that may be expected to affect their personal income.

More precisely, our instrument for changes in local housing values is constructed as follows. For the locality, m, in which parents reside in year $t_{16,j}$, we obtain housing price indices, HPI_{mt}, from external data sources to construct the percentage change in local housing values. Where possible, i.e., where we have data on local housing prices, we define the local housing market at the zip code level and, where possible, we use housing price indices constructed by Zillow. For zip codes where a Zillow price index is not available in year $t_{16,j}$, we use the Zillow index for the county in which the parents/child reside in that year. When a price index is not available for the parents' county of residence, we use the price index of the MSA- or state-of-residence. Finally, for some years and locations in which the parents in our data

reside in markets not covered by Zillow data, we make use of the housing price index constructed by the Federal Housing Finance Agency (FHFA) as our measure of HPI_{mt}. With the resulting indices, we construct the percentage change in this index over a 4-year period centered on year t_{16_j},

$$\frac{HPI_{mt_{18_j}} - HPI_{mt_{14_j}}}{HPI_{mt_{14_j}}}. \tag{2.10}$$

We note that by using percentage changes in housing price indices, HPI_{mt}, rather than simple changes, we minimize any problems of non-comparability of the Zillow and FHFA housing price indices.[20] We then "scale" this percentage change by the net home equity the parents report in year t_{16_t} to form our housing market instrument:

$$\Delta HPI_{mt_{18_j}} \equiv H_{imt_{16_j}} \left[\frac{HPI_{mt_{18_j}} - HPI_{mt_{14_j}}}{HPI_{mt_{14_j}}} \right]. \tag{2.11}$$

We note that we found that trimming the changes affects the precision of our results.

For our instrumental variable for local labor market conditions, we use data from the QCEW to obtain the average annual wages in each county, m, in each year, t. We then construct average wages by county-of-residence of parents for the years around when their child was age 16, i.e., t_{16_j}. We denote these average wage measures by $\overline{W}^P_{mt}$. We then construct the percentage changes in these average wages, i.e.,

$$\frac{\overline{W}^P_{mt_{18_j}} - \overline{W}^P_{mt_{14_j}}}{\overline{W}^P_{mt_{14_j}}}, \tag{2.12}$$

and scale it by parent's annual income in year $t_{16,j}$ to construct the following instrumental variable:

$$\Delta W^P_{mt_{18_j}} \equiv Y_{imt_{16_j}} \left[\frac{\overline{W}^P_{mt_{18_j}} - \overline{W}^P_{mt_{14_j}}}{\overline{W}^P_{m,t_{14_j}}} \right]. \tag{2.13}$$

[20] We trimmed these changes when they were exceedingly large in absolute value.

Thus, our vector of instruments is given by $\boldsymbol{Z}_{imt_{18_j}} \equiv (\Delta HPI_{mt_{18_j}}, \Delta W^P_{mt_{18_j}})$. The statistics for tests of the joint significance of the instruments for both parental net equity and income are in Appendix Table A.2.) and indicate sufficiently strong instruments.

2.3.3 Empirical Results

Table 2.4 presents the results of estimating (2.5) and (2.9). For the college choice and financing models, (2.5), we show estimates of the marginal effects of parental net equity (H) and income (Y) on children's college choices ($EduFin0, EduFin1$ and $EduFin1$) for the unadjusted multinomial logit specification as well as those for our preferred estimates based on the control function estimator. For the models of amounts conditional on a transfer, (2.9), we present OLS and 2SLS coefficient estimates for H and Y.

In Panel A of Table 2.4, we present estimates of the marginal effects of parents net (home) equity when their child was age 18 ($H_{imt_{18_j}}$) and parents' annual income at that age ($Y_{imt_{18_j}}$) for the unadjusted multinomial logit specification. A \$10,000 increase in home equity decreases the likelihood that the child does not attend college by 0.39 percentage points, increases the likelihood that they attend college but with no parental transfer by 0.03 percentage points and increases the likelihood that they go to college and their parents provide financial help by 0.36 percentage points, with the first and the last of these effects being statistically significant at least the 10% level. Similarly, a \$10,000 increase in parents' annual income decreases the likelihood that the child does not attend college by 1.96 percentage points, increases the likelihood that they attend college but with no parental transfer by 0.85 percentage points and increases the likelihood of the child going college and receiving financial help from their parents by 1.11 percentage points, with all three of these effects being being statistically significant at the 1% level.

In Panel B of Table 2.4 we account for the potential endogeneity of parental home equity and income on these choices. We find that a $10,000 increase in parental housing wealth increases the likelihood of attending college with a parental transfer by 0.58 percentage points. The effect of a $10,000 increase in income is over twice as large, increasing the likelihood of attending college with a parental transfer by 1.69 percentage points and decreasing the likelihood of not attending college by 2.14 percentage points, with both of these effects being precisely estimated.

In order to compare the effects of parents' net home equity and income on comparable terms, we compute estimates of the elasticities for these variables. For our preferred control function estimates, the elasticity of parental income with respect to not going to college is -0.374 and for going to college and receiving financial help is 0.500. In contrast, for parents' net housing equity the elasticities are much smaller at (-0.046 and 0.128, respectively).[21]

Our estimates of the effects of parental housing wealth (H) on the likelihood of a child attending college – here measured as the negative value of the estimates of H on not attending college – are consistent with and quite similar in magnitude to those in Lovenheim (2011), although only the multinomial logit estimates are statistically significant. Furthermore, we find that increases in parental income (Y) increase the likelihood of attending college – again measured as the negative of the effects on not attending college – which is consistent with the findings in Belley and Lochner (2007); Lochner and Monge-Naranjo (2011), and Lochner and Monge-Naranjo (2012). Moreover the latter effects are statistically significant for both our multinomial and control function specifications. But, as discussed above, our findings make clear that the mechanism through which parental income and wealth affect college attendance is through their effects on the the likelihood that parents choose to help finance

[21] These elasticities are evaluated at the means of both the probabilities of $EduFin0$ and $EduFin2$ and $Y_{imt_{18_j}}$ and $H_{imt_{18_j}}$ found in Table 2.2.

their child's education. Furthermore, the effects of H and Y on the college and transfer choice ($EduFin2$) are statistically significant for both the multinomial logit and control function specifications, while the effects of both of these variables on the college but no parental transfer small and not statistically significant for our preferred control function specification.

The estimated effects of parental home equity and parental income on the amount of parental transfers for their children's college education, for both OLS and 2SLS, are found in Panel C of Table 2.4. Ignoring the endogeneity of parental home equity and income, the OLS results indicate that a $10,000 increase in net home equity would increase the amount of parental financial support by an average of $316, while a comparable increase in parents' income would increase the average amount transferred by $769. In our preferred 2SLS specification, we find that a $10,000 increase in home equity increases parental transfers by only $205 and this effect is no longer statistically significant. However, we find that increases in parental income now have a much larger effect on the amount of parental transfers, with a $10,000 increase in parental income resulting in an average increase in parental transfers $1,510, with the latter effect being precisely estimated. Translating these effects of parental home equity and income on parental financial support for their children going to college to elasticities, we again find that the elasticity for net home equity is fairly small (0.151) while the elasticity with respect to parental income is sizable (1.489).

Taken together these results strongly suggest that both parental wealth and parental income are important in determining both the likelihood of their children attending college and, importantly, their parents helping to finance it. But, that the effects of changes in parental income on college attendance and financing decisions are larger than similar changes in parental wealth. One important difference between our work and prior work on the role of housing wealth in college attendance

decisions is the time period that we analyze. Lovenheim (2011) focused on the years between 2000 and 2005 when house prices were growing rapidly and home equity lines of credit were plentiful. In contrast, we include both an earlier period (1997 - 1999), and, more importantly, the later period (2006 - 2013) in which house prices fell or were largely stagnant and home equity lines of credit became increasingly difficult to obtain. Changes in the ability to access home equity lines of credit have played a role in explaining the relative importance of income in college attendance and financing decisions. When home equity lines of credit become more difficult to access, parental income may have become a more likely source for financing large consumption expenses like their children's college educations. It is also possible that family income became more important in the ability to access credit in the aftermath of the Great Recession which would exacerbate the importance of income for being able to provide financial assistance for college. We return to this issue below in the discussion of our results for college graduation.

Table 2.4: Marginal Effects of Changes in Wealth and Income on College & Financing Choices and Amount of Financing[1]

	College and Financing Choices:			*Amount of Transfer:*	
	$EduFin0$ (No Coll)	$EduFin1$ (Coll, but No Transfer)	$EduFin2$ (Coll & Transfer)	OLS	2SLS[2]
Variable	(1)	(2)	(3)	(4)	(5)
Panel A. Schooling and Financing Choice, Multinomial Logit					
$H_{imt_{18_j}}$	-0.0039*	0.0003	0.0036***		
	(0.0021)	(0.0015)	(0.0012)		
$Y_{imt_{18_j}}$	-0.0196***	0.0085***	0.0111***		
	(0.0032)	(0.0028)	(0.0026)		
N			2,651		
Panel B. Schooling and Financing Choice, Control Function[2]					
$H_{imt_{18_j}}$	-0.0035	-0.0022	0.0058**		
	(0.0051)	(0.0045)	(0.0028)		
$Y_{imt_{18_j}}$	-0.0214***	0.0045	0.0169***		
	(0.0056)	(0.0046)	(0.0045)		
N		2,645			
Panel C. Transfer Amounts, OLS and 2SLS					
$H_{imt_{18_j}}$				0.0316***	0.0205
				(0.0118)	(0.0199)
$Y_{imt_{18_j}}$				0.0769***	0.1510***
				(0.0162)	(0.0357)
R^2				0.400	0.375
N				2,551	2,551

[1] Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and state fixed effects.

[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the control function and 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 2.3.2 for a description of these instruments.

2.4 Effects of Parental Wealth & Income on College Graduation and Costs & Quality of Colleges Attended

In the preceding section, we found that parental income, more so than parental home equity, increases the likelihood that children attend college and that this effect is largely driven by the fact that parental income increases the likelihood and the amount of financial help parents provide for sending their children to college. We next examine whether parental wealth and income affect the likelihood that children graduate from college and the quality of the college they attend.

2.4.1 Modeling Children's College Attainment & Quality

As noted in Section 2.2.3, we use information on completed schooling reported in the 2013 PSID Roster and Transfers Module to form measures of whether each child j of parent i that attended college at age 18 graduated from college – which we denote by dummy variable $Grad_{ij,18_j}$. We obtain the annual tuition costs for a full-time student at that institution in the year they would have started college — which we denote by the variable $Tuition_{ij,18_j}$. We measure whether the institution was a 4-year college or university – denoted by the variable $4YrColl_{ij,18_j}$ – and whether it was a private institution – denoted by the dummy variable $Private_{ij,18_j}$. We denote the quality index described in Section 2.2.3 by $Quality_{ij,18_j}$.

In Table 2.5, we display the mean values for these measures of the college attributes described above. One can see that all of the measures of college attainment and quality are greater for children attending college with parental financial support compared to those attending without it. This is especially true for the college quality index ($Quality_{ij,18_j}$), which increases from 0.07 for college attended by children who did not receive financial help from their parents to 0.49 for those that did.

We examine how parental income and parental housing wealth affect college quality using changes in parental income and wealth in the years before a child turns 18

Table 2.5: College Graduation, Annual Tuition, Types of College and College Quality[1]

Variable	Full Sample	Attended College	$EduFin1$ (Coll, but No Transfer)	$EduFin2$ (Coll & Transfer)
Graduated from College $(Grad)^2$	0.27	0.40	0.37	0.43
Annual Tuition $(Tuition)^2$		\$9,608	\$7,776	\$10,924
Attended 4-Year College $(4YrColl)^2$		0.82	0.76	0.87
Attended Private College $(Private)^3$		0.33	0.31	0.35
College Quality Index $(Quality)^3$		0.33	0.07	0.49

[1] Statistics weighted using PSID family weights. Tuition amounts are in 2013\$.
[2] Conditional on those students who attended college at age 18.
[3] Conditional on those who attended a 4-year college at age 18.

as instruments for income and housing wealth. These specifications mirror those on college attendance and financing decisions in Section 2.3.3 estimating regressions of the following form:

$$CollOut_{qij,18_j} = \lambda^O_{q0}+\lambda^O_{q1}H_{imt_{18_j}}+\lambda^O_{q2}Y_{imt_{18_j}}+\boldsymbol{\lambda}^O_{q3}\boldsymbol{X}_{ij_{18_j}}+\boldsymbol{\lambda}^O_{q4}\boldsymbol{M}_{mt_{18_j}}+\phi^O_{qt_{18_j}}+\delta^O_{qm}+\varepsilon^q_{ij,18_j}, \tag{2.14}$$

for $CollOut_q = Grad, Tuition, 4YrColl, Private$ and $Quality$ and where $\phi^O_{qt_{18_j}}$ and δ^O_{qm} are year and the parents' county fixed effects, respectively. The vector, $\boldsymbol{X}_{ij_{18_j}}$, used in (2.14) is the same as the one used in equations (2.5) and (2.7) through (2.9) except that also includes a dummy variable for whether the child has become a head or wife in a PSID household by age 24. This extra variable controls for the source of data from which college information is obtained (PSID main interview versus Transition to Adulthood).[22]

[22] As noted in Section 2.2.2, if adult children have become a head or wife of a PSID household by age 24, their data can be drawn from the PSID main interview and is, in principle, available for all of the years, t_{24_j}, that we analyze. In contrast, if adult child j does not become a head of wife of a PSID household by 2013 – the year of the last wave of the PSID used in our analyses – we use data about the characteristics of the college child j attended from the PSID Transition to Adulthood sample. But this latter sample is only available for more recent (calendar) years. Thus, including this extra dummy variable in (2.14) allows us to account potential differences across these two different sources of data used to determine the dependent variables, $Tuition_{ij,18_j}$, $4YrColl_{ij,18_j}$, $Private_{ij,18_j}$ and $Quality_{ij,18_j}$.

Finally, to account for the potential endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ in (2.14), we again employ a 2SLS estimator for (2.14), using the two instruments, $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$, that were defined in Section 2.3.2 and used in the control function estimation of college choices and parental financing decisions and the amount of parental financial support provided to their child.

2.4.2 Empirical Results

In Panel A of Table 2.6 we present the estimates of the effects of parental net housing equity ($H_{imt_{18_j}}$) and income ($Y_{imt_{18_j}}$) on whether child j graduates from college as well as the various indicators of the quality of the college. OLS estimates are presented in in columns (1) and (3) and 2SLS estimates in columns (2) and (4) for these outcomes outcomes. We first consider the results for whether the child graduates from college, displayed in Panel A of Table 2.6. We find evidence that parent's net equity at the time of the college decision increases the probability that their child graduates from college. But, in contrast to our findings on college attendance, we do not find any effect of family income on college graduation once we control for the endogeneity of family income.

The results on graduation show an interesting contrast between how parental resources when a child is age 18 affect college enrollment versus college graduation. We find that both parental income and parental wealth when a child is 18 increase the likelihood of attending college but only parental wealth when a child is 18 increases the likelihood of graduating from college.

One possible explanation for these contrasting results is that increases in parental income when their child is 18 can finance their child's college enrollment but may not be sufficient, on average, to cover the full costs of attaining a degree. In contrast, parents who experience an increase in housing wealth can secure loans, such as a home equity loan, which can be used to finance their child's entire college career.

These loans are common, almost 12% of parents in our sample had such a loan when their child was age 18.

To explore this possibility, we examine the effect that parents having a home equity loan when their child was 18 has on the likelihood of their child graduating from college over and above parental wealth (H) and income (Y) (results not shown in Table 2.6). Adding this indicator variable to the regression in (2.14) for *Grad* as the outcome, we find that having a home equity loan at the time the child is age 18 increases the likelihood that the child graduates from college by 8.6 percentage points.[23] These results suggest that home equity loans are an important channel though which parents are able to continue to provide financial support throughout their child's college years. Combined with the larger effect of parental income than parental wealth on college attendance, the results suggest that increases in family income change choices about college only at a short lag length, whereas wealth effects are more enduring.

In Panels B and C of Table 2.6, we present OLS and 2SLS estimates of the effects of parental net equity and income on the various attributes of the college the children attended, starting at age 18. Looking first at the effects of parental home equity on the various attributes and types of colleges attended, we find the effects to be very small. For example, a $10,000 increase in parental net equity would result in the child going to a college that is only slightly more expensive, ranging from $99 based on OLS estimates to $112 based on the 2SLS estimates. (Recall from Table 2.5 that the average annual tuition of college attended is $9,682.) Similarly, a $10,000 increase in parents' home equity would increase the probability of attending

[23] We also estimate a specification in which we treat having a home equity loan at age 18 as an additional endogenous variable, using a set of squared changes in local home prices and local labor markets and their interactions as additional instruments, and find that in this specification, having a home equity loan when the child is 18 also increases the likelihood of graduation. The results for this augmented specification of the likelihood of a child graduating from college are found in Table A.4.

a private college by 0.2 percentage points (based on OLS) and would reduce it by 0.7 percentage points (based on 2SLS). Furthermore, none of the effects of parental home equity are precisely estimated. With respect to the effects of parental income on the tuition, types and quality of the college attended, none of the other estimated effects of parental are precisely estimated, with the exception of the OLS estimated effects on the quality of college children attended. Furthermore, increases in parental income seem to have relatively negligible effects whether their children go to a more expensive school, one that is private or one that is of higher quality.

The lack of precision in the estimates of the effects of parental home equity and income may be due, in part, to the smaller sample sizes used to estimate the effects found in Table 2.6 compared the likelihood of graduation in Panel A of Table 2.6. The samples used to estimate the effects presented in Panels B and C of Table 2.6 are almost half of those used to estimate the effects for college graduation in Panel A. Although we note in Appendix Table A.2 that the first-stage results are slightly above the conventional cutoff value.

In summary, it appear that increases in parental wealth do result in statistically significant but small increases the likelihood that children will graduate from college. Our finding for the likelihood of graduation is notable, since Cooper and Luengo-Prado (2015) did not detect any effects of parental housing wealth on college graduation, despite the fact that parental housing wealth appears to increase the labor earnings of their adult children. One reason for the greater precision of our results is that we use the better measure of the educational attainment of children available in the 2013 Roster and Transfers data. At the same time, our findings do not clearly indicate that greater parental income (or housing wealth) decidedly alters the likelihood of their child attending a more expensive college, a private one, or a more highly ranked one, although the smaller sample sizes used to estimate these effects may have contributed to latter null findings.

Table 2.6: Effects of Parents' Home Equity and Family Income on Probability of Child Graduating from College & the Quality of the College their Children Attended[1]

Variable	OLS (1)	2SLS[2] (2)	OLS (3)	2SLS[2] (4)
Panel A.	*Graduate from College:*[2]			
$H_{imt_{18_j}}$	0.000	0.011*		
	(0.002)	(0.005)		
$Y_{imt_{18_j}}$	0.004*	0.006		
	(0.002)	(0.004)		
R^2	0.291	0.266		
N	1,322	1,322		
Panel B.	*Annual Tuition Costs*[2]		*Attended 4-Year College*[2]	
$H_{imt_{18_j}}$	99.943*	112.302	0.003	-0.001
	(51.204)	(148.424)	(0.002)	(0.005)
$Y_{imt_{18_j}}$	19.887	4.892	-0.001	0.003
	(63.967)	(164.709)	(0.003)	(0.006)
R^2	0.397	0.397	0.288	0.280
N	786	786	793	793
Panel C.	*Attended Private College*[3]		*College Quality Index*[3]	
$H_{imt_{18_j}}$	0.002	-0.007	0.015	-0.024
	(0.003)	(0.009)	(0.010)	(0.026)
$Y_{imt_{18_j}}$	-0.002	0.002	0.020*	0.037
	(0.003)	(0.007)	(0.011)	(0.035)
R^2	0.300	0.283	0.343	0.304
N	653	653	640	640

[1] Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, whether the child is a head or wife at age 24, the high school and college wage premium, year fixed effects, and county fixed effects.
[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 2.3.2 for a description of these instruments.
[2] Conditional on those students who attended college at age 18.
[3] Conditional on those who attended a 4-year college at age 18.

2.5 Consequences of Parental Financing Decisions for Parents' and Child's Subsequent Indebtedness

Finally, we provide evidence of the consequences of decisions about attending college and parental financing on levels of debt parents and children hold after the college years. In what follows we outline our strategy for estimating these relationships, explicitly examining whether children who attend college and their parents end up accumulating more debt, whether parental financial support for college leaves parents with more debt, and whether such support reduces the amount of debt children accumulate.

2.5.1 Modeling the Effects of College/Financing Choices on Later Financial Debt of Parents and Adult Children

Let $Debt_{nht_{a_j}}$ denote the debt of household n where $n = i$ for the parent household and $n = j$ for the child household, of type h, measured in year t_{a_j} when child j is age a. We choose $a = 24$ as six-years after enrollment decisions and when financing for higher education is largely complete. For parents, we consider mortgage debt ($MortBal_{it_{24_j}}$), and all other non-housing debt ($OthDebt_{it_{24_j}}$), both measured when the child is age 24 (t_{24_j}). For children, we examine debt in the form of outstanding student loans ($StudentDebt_{jt_{24_j}}$), as well as total non-housing debt ($OthDebt_{jt_{24_j}}$), both measured in t_{24_j}.

In Table 2.7, we display the mean values of mortgage and total non-housing debt for parents and student loan and other non-housing debt for children at age 24. Parents, on average, have \$69,500 in mortgage debt and \$13,400 in other debt when their child is age 24. Parents whose child did not attend college have much lower levels of debt: \$45,400 in mortgage debt and only \$8,400 in other debt. Parents of children who did attend college but did not provide financial help hold higher debt balances: \$59,400 in mortgage debt and \$13,500 in other debt. Finally, parents

who helped finance their child's college education have much higher amounts of both types of debt: $100,100 in outstanding mortgage debt and $18,000 in other debt.

At age 24, children, on average, hold $12,300 in student debt and the same amount in total non-housing debt. Those children who did not attend college, not surprisingly, hold almost no student loan debt, $2,200 (presumably because of other education-related expenses) and $8,000 in total non-housing debt. Children who attended college but received no help from their parents hold only somewhat more debt than the average child, but a good deal more than their counterparts who did not attend college: $15,000 in other debt and $16,800 in outstanding student loans. Finally, among those children who went to college and got financial help from their parents, their debt levels were slightly, but only slightly, lower than those who went to college without parental help: $13,200 in total non-housing debt and $16,900 in student debt, the same as those who had no help from parents. These levels of student debt are very similar to those estimated by Andreski et al. (2015) who show that the estimates of student loans from the PSID TA study are similar to those in the National Postsecondary Student Aid Survey.

Table 2.7: Parents' & Child's Debt when Child Age 24, by College Attendance and Financing Decisions[1]

Variable	Full Sample	$EduFin0$ (No Coll)	$EduFin1$ (Coll, No Transfer)	$EduFin2$ (Coll & Transfer)
Parents' Debt:				
Mortgage Debt ($MortBal$)	$6.95	$4.54	$5.95	$10.01
Other Debt ($OthDebt$)	$1.34	$0.84	$1.35	$1.80
Child's Debt:				
Other Debt ($OthDebt$)	$1.23	$0.80	$1.50	$1.32
Student Debt ($StudentDebt$)	$1.26	$0.22	$1.68	$1.69

[1] Statistics weighted using PSID family weights. All debt amounts are in 10K of 2013$.

These descriptive findings suggest that parents may shelter their college-going children from some, although not most, of their post-college debt. At the same time, parents who help finance their children's college education may end up with more debt of their own, especially mortgage debt. In the next section, we outline an estimation strategy to assess whether these latter descriptive results are causal.

The specifications we use to examine the effect of whether a child went to college and whether parents helped finance college on the subsequent indebtedness of parents and their children differ from those in Sections 2.3 and 2.4. Here we focus on the direct effect of college attendance and parental financing decisions on the additional amount of debt parents and children accumulate. As we describe below, this requires some additional controls and creates new challenges for identifying causal relationships.

More precisely, let $Attend_{ij}$ be an indicator variable equal to 1 if child j of parent i attends college and zero otherwise,[24] and define $AttendFin_{ij}$ to be the indicator variable equal to 1 if child j attends college and parent i provides funds to finance it and zero otherwise,[25] We are interested in the effects of these variables on parents' and children's debt when the child reaches age 24 in year t_{24_j}, net of other factors. More precisely, for parents we seek to estimate the following specification for two sources of debt:

$$\begin{aligned} Debt_{hit_{24_j}} &= \beta^P_{nh0} + \beta^P_{h1} Attend_{ij} + \beta^P_{h2} AttendFin_{ij} + \beta^P_{h3} Y_{imt_{24_j}} \\ &\quad + \boldsymbol{\beta}^P_{h4} \boldsymbol{X}_{it_{24_j}} + \phi^P_{ht_{24_j}} + \delta^P_{hm} + u^P_{hit_{24_j}}. \end{aligned} \tag{2.15}$$

for $Debt_h = MortBal, OthDebt$, $Y_{imt_{24_j}}$ is the parents' income in year t_{24_j}, $\boldsymbol{X}_{it_{24_j}}$ is a vector of parent i's characteristics in that year, $\boldsymbol{M}_{mt_{24_j}}$ are the corresponding characteristics for parents' location m at t_{24_j} and $\phi^P_{t_{24_j}}$ and δ^P_s are year and the

[24] $Attend_{ij} = 1$ if either $EduFin1_{ij} = 1$ or $EduFin2_{ij} = 1$ and equals zero otherwise.

[25] That is, $AttendFin_{ij} = EduFin2_{ij}$.

parents' county fixed effects, respectively. Included in $\boldsymbol{X}_{it_{24_j}}$ are the same characteristics described in Section 2.3.1 where all time-varying covariates are measured in year t_{24_j} instead of year t_{18_j} used in our previous analyses. In addition, we include non-housing wealth of the parent at age 24, the value of the home measured at age 18, and parental income at age 24.

Similarly, for the children at age 24, for parents we seek to estimate the following specification for their two sources of debt:

$$\begin{aligned} Debt_{hjt_{24_j}} &= \beta^C_{nh0} + \beta^C_{h1} Attend_{ij} + \beta^C_{h2} AttendFin_{ij} + \beta^C_{h3} Y_{jmt_{24_j}} \\ &\quad + \boldsymbol{\beta}^C_{h4} \boldsymbol{X}_{jt_{24_j}} + \phi^C_{ht_{24_j}} + \delta^C_{hm} + u^C_{hjt_{24_j}}. \end{aligned} \tag{2.16}$$

for $Debt_h = OthDebt, StudentDebt$, $Y_{jmt_{24_j}}$ is child j's income in in year t_{24_j}, $\boldsymbol{X}_{nt_{24_j}}$ is a vector of child j's characteristics at child age 24, and $\phi^C_{t_{24_j}}$ and δ^C_s are year and the child's state-of-residence fixed effects, respectively. Included in $\boldsymbol{X}_{nt_{24_j}}$ are all of the characteristics of the parent described in Section 2.3.1 where all time-varying covariates are measured in year t_{24_j}, along with an indicator variable for coresidence with a parent, an indicator variable if the child is married in year t_{24_j}, an indicator variable for whether the child is a head of household in year t_{24_j}, and family income of the child at age 24.

Below, we present estimates of the effects of *Attend* and *AttendFin* in specifications in (2.15) and (2.16) using ordinary least squares (OLS). But, it is reasonable to presume that parents' and children's income when the child is age 24, $Y_{imt_{24_j}}$ that is included in (2.15) and $Y_{jmt_{24_j}}$ in (2.16), respectively, are likely to be endogenous, especially given that these variables are contemporaneous with when we assess parents' and children's levels of debt. Furthermore, the decisions concerning whether a child went to college but parents did not help finance it ($Attend_{ij} = 1$) or parents did help finance it ($AttendFin_{ij} = 2$) may be correlated with the unobserved factors

that make up $u^P_{hit_{24_j}}$ and $u^C_{hit_{24_j}}$ in these debt specifications. This would be the case if the unobserved determinants of the college and parental financing choices accounted for in the payoff functions in (2.5), made when the child was age 18, and those in (2.15) and (2.16) are common across time and/or were serially correlated.

To account for the potential endogeneity of parents' and children's income when the child is age 24 in the debt regressions, we follow the strategy we used to instrument parental income at age 18 in the college choice and financing specifications discussed in Section 2.3.2 and define as a new instrumental variable the local labor market variable $\Delta W^P_{mt_{24_j}}$, which is defined in the same way as $\Delta W^P_{mt_{18_j}}$ for the market, m, in which person n ($n = i$ for parents and $n = j$ for children) resides in year t_{24_j}. We also define an additional instrument which which measures the distance child j was from the nearest a four-year public college in their county m when child j was age 18.[26]

A plausible set of instruments for *Attend* and *AttendFin* in (2.15) and (2.16) would be to use the local market variables, $\Delta HPI_{mt_{18_j}}$ and $\Delta W_{mt_{18_j}}$, measured at t_{18_j}, that were used to instrument $H_{jmt_{18_j}}$ and $Y_{jmt_{18_j}}$ in the control function estimator of the college enrollment and transfers decisions, and the 2SLS estimation of the amount of the transfer and the graduation and college quality outcomes. We employed these instruments, along with $\Delta W^P_{mt_{24_j}}$ and $Dist4YrPub_{ijm}$, to instrument for *Attend*, *AttendFin* and $Y_{jmt_{24_j}}$ in a 2SLS estimation of the specifications in (2.15) and (2.16). But, the first stage results for both *Attend* and *AttendFin* in these specifications indicated very weak instruments, with the test statistics for the joint significance of these instruments for *Attend* and *AttendFin* never being greater

[26] Using PSID geocode data on the location of their parents' residence at that age and geocoded data from IPEDS on the location of all public universities, we constructed the variable, $Dist4YrPub_{ijm}$, as the distance, in miles, to the nearest four-year public university. A comparable measure was used in Card (1995) and others as an instrument for schooling in the estimation of the returns to schooling.

than 9.8 and most of never being greater than 5.0. In contrast, and as reported in Appendix Table A.3, the first stage estimates for $Y_{jmt_{24_j}}$ using these same instruments produced test statistics greater than 22. Accordingly, in the analysis below, we report 2SLS results for the estimation of (2.15) and (2.16) in which we only account for the endogeneity of $Y_{jmt_{24_j}}$. Because of this, we take care not to over-interpret the 2SLS results presented below.

2.5.2 Empirical Results

Panel A of Table 2.8 presents the results of estimating the specification for parental debt in equation (2.15). We show estimates from OLS specifications in which college attendance and financing is taken as exogenous and from 2SLS specifications in which we instrument for the effects of parental income in year t_{24_j}. In these tables, we only display the effects of children attending college ($Attend$) and whether parents helped finance their child's college education ($AttendFin$) on parent levels of debt when their child was age 24. With respect to parents mortgage debt, both the OLS and the 2SLS results indicate that parents who provide children with a financial transfer for college have more outstanding mortgage debt six years after their child entered college, i.e., when their child is age 24, relative to parents whose child did not attend college. The OLS and 2SLS results indicate that parents who help finance their child's college attendance have more mortgage debt, $15,930 based on the OLS results and $15,920 with the 2SLS. Furthermore, both of these effects are precisely estimated. And, parents whose child attends college without receiving a financial transfer from parents do not hold more mortgage debt than parents whose child did not attend college.

Panel A also includes estimates the effect of a child's college attendance and parental financing on the amounts of non-housing debt parents hold in year t_{24_j}. For

both the OLS and the 2SLS results, we find that having a child who attends college increases parental non-housing debt when their child is age 24 relative to having a child who does not attend college ($3,460 with OLS and $3,420 with 2SLS), although these increases are much smaller than those for mortgage debt. Both of these effects are precisely estimated. With respect to the additional effect of parents helping to finance college ($AttendFin$), we find small positive effects on other debt, but neither the OLS or 2SLS estimates are statistically significant. As a result, one cannot reject the hypothesis that this source of debt does not differ between parents who provide financial transfers to their children to attend college those who do not.

In Panel B of Table 2.8 we present estimates of the effects of college attendance and parental financial support on the debt levels held by children at age 24. With respect to both the OLS and 2SLS results, we find that children who attend college ($Attend$) have substantially higher student loan ($14,430 based on OLS and $14,290 with 2SLS) and other forms of debt ($10,470 with OLS and $10,420 with 2SLS) than children who do not attend college and these effects are precisely estimated. In contrast, children whose parents help to finance their college education do not hold less student debt or other forms of debt than children who attend college without parental financial support. These results suggest that there is not necessarily a reduction in student debt when parents provide financial support for college. One reason we may find similar levels of student debt among children whose parents finance and do not finance college is that students whose parents provide financial support for college are more likely to graduate and thus they pay for more total years of schooling. But, as noted at the end of the previous section, one must be cautious in interpreting these findings for the effects of college attendance and parental financing on parents' and children's subsequent levels of debt as causal, given that they do not account for the potential endogeneity of either $Attend$ and $AttendFin$ our 2SLS results.

Table 2.8: Effects of Child's College Attendance and Parental Financing on Parents' and Child's Indebtedness when Child is Age 24[1]

Variable	OLS (1)	2SLS[2] (2)	OLS (3)	2SLS[2] (4)
Panel A. Parents' Debt:[3]	*Mortgage Debt*		*Other Debt*	
No College (base category)				
Attends College (*Attend*)	-0.602	-0.604	0.346**	0.342**
	(0.466)	(0.467)	(0.163)	(0.155)
Attends with Financing (*AttendFin*)	1.593***	1.592***	0.235	0.800
	(0.568)	(0.533)	(0.184)	(0.695)
R^2	0.468	0.486	0.231	0.231
N	2,270	2,270	2,268	2,268
Panel B. Child's Debt:[4]	*Student Loan Debt*		*Other Debt*	
No College (base category)				
Attends College (*Attend*)	1.443***	1.429***	1.047***	1.042***
	(0.211)	(0.193)	(0.247)	(0.244)
Attends with Financing (*AttendFin*)	-0.116	-0.102	-0.307	-0.307
	(0.334)	(0.306)	(0.225)	(0.211)
R^2	0.286	0.285	0.108	0.108
N	1,152	1,152	1,587	1,587

[1] Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All debt amounts are in 10K of 2013$.

[2] The variables Parental Income in year t_{24_j} ($Y_{imt_{24,j}}$) for Panel A specifications and Child's Income in year t_{24_j} ($Y_{jmt_{24,j}}$) for Panel B specifications were treated as endogenous in the 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$, $\Delta W^P_{mt_{18_j}}$, $\Delta W^P_{mt_{24_j}}$ and $Dist4YrPub_{ijm}$. See Sections 2.3.2 and 2.5.1 for descriptions of these instruments.

[3] The explanatory variables included in Panel A regressions are as follows: characteristics of parents when child was 24 (age, marital status, family structure, education, sex, race), sex of child, non-equity wealth of the parent when the child is 24, value of home at 18, year fixed effects, and county fixed effects.

[4] The explanatory variables included in Panel B regressions are as follows: characteristics of parents when child was 14 (age, marital status, family structure, education, sex, race), sex of child, whether the child is a head or wife at age 24, whether the child is married by 24, year fixed effects, and county fixed effects.

2.6 Conclusion

This paper examines the influence of parental housing wealth and income on college attendance and parental financial support for college and on college graduation rates and quality of college attended. It also examines the ramifications of these decisions on the subsequent indebtedness of parents and children. We use data from the PSID, especially data in the 2013 Roster and Transfers Module on the incidence and amounts of parental financial support for college. We instrument for the potential endogeneity of parental housing wealth and income with changes in parents' local housing and labor market conditions to generate causal estimates of the effect of parental housing wealth and income on educational outcomes. We find that increases in parental income and wealth increase the likelihood of children attending college, largely because it increases parental provision of financial support. The effect of an increase in parental income on college enrollment is larger than the effect of an increase in parental wealth. But, parental wealth increases graduation rates, while parental income does not seem to have an effect on college graduation. We find that the effect of parental wealth on college graduation is related to parents taking out home equity loans which appear to have a large effect on the likelihood that a child graduates from college. We also find suggestive evidence that the decision to provide financial support for a child's schooling increases levels of parental mortgage debt. In contrast, students who attend college with financial support from parents do not have lower levels of student and other debt later in life than children who attend college without financial support.

These findings fill gaps in prior research by establishing that the mechanism through which increases in parental income and wealth affect college attendance is indeed through parental financial transfers. Our findings also complement recent work suggesting an increasingly important role for parental income in college atten-

dance decisions. And, we provide the new evidence based on PSID data that the likelihood of children graduating from college increases with higher levels of parental wealth, likely due to the more complete data on children's college attainment gathered in the Roster and Transfers Module in the 2013 wave of the PSID. Finally, though our results about debt are more descriptive, they do indicate that parents who provide financial transfers to their children take on additional debt of their own. The increases in parental debt as a result of college financing decisions may simply reflect an efficient way to fund college tuition. Alternatively, this increase in parental debt may represent an intergenerational shifting of debt incurred with children going to college, one that represents a burden on parents that may adversely affect their later-life consumption or other measures of well-being. This is an important avenue for future research especially in light of the large increases in college tuition and in levels of student debt in recent years.

3

Black-White Differences in the Role of Parents' Wealth and Income in Their Children's College Enrollment, Graduation, and Its Financing

3.1 Introduction

Even as more and more individuals pursue college, large racial disparities remain in educational outcomes. Four, five, and six year graduation rates were at least 20 percentage points higher for white students than for black students in 2011 (DeAngelo et al., 2011). Part of this gap is due to racial differences in college enrollment. In 2010 43% of white adults age 18-24 were enrolled in college, a full 5 percentage points higher than the 38% of black students who enrolled. But even accounting for the difference in enrollment rates, African American undergraduates are less likely to graduate from college than their white peers. Also in 2011, 39% of white adults between 25 and 29 had graduated with a bachelor's degree compared to 19% of black adults the same age, a difference of 20 percentage points (McFarland et al., 2018).

Previous work has established a link between parents' resources, in particular income and wealth, and post-secondary educational outcomes for their children.

Parental wealth is a strong predictor of whether a child enrolls in college (Jez, 2014), as well as whether or not they graduate (Conley, 2001). In addition, parental income has become increasingly important for college enrollment in the new millenium (Lochner and Monge-Naranjo, 2011, 2012). These positive associations between parental income and wealth and their children's educational outcomes persist even after controlling for cognitive and noncognitive skills of parents (Doren and Grodsky, 2016).

Housing wealth is the central contributor to wealth for middle-class families (Wolff, 2016), and has been identified as having particular importance for college attendance and attainment. Lovenheim (2011) examines the effect of wealth via rising house prices for homeowning parents during a child's teenage years and finds that increases in home equity raise the likelihood the child enrolls in college, with especially large effects for low-SES families. Lovenheim and Reynolds (2013) show that increases in parental home value raise the probability of completing college for low-income students. Cooper and Luengo-Prado (2015) find that house price appreciation for parents when their child is age 17 leads to higher college enrollment rates, although they do not find significant effects on graduation. Finally, Hotz et al. (2018) examine the effects of both parental income and housing wealth together, and find that both parental income and parental home equity increase the likelihood of college attendance for children via the mechanism of increased parental transfers to their children for their education. They find a larger effect of parental income than wealth on enrollment, but they find that increases in wealth increase the likelihood of graduating from college.

With the important role parental wealth and income play in determining the educational outcomes of their children, some of the racial disparity in college enrollment, quality, and attainment may be explained by the massive income and wealth gaps between black and white Americans. In 2014 the median income for white

households was $60,256 compared to $35,398 for black households (DeNavas-Walt and Proctor (2015)). During the period from the mid-1980s through the mid-2000s, white households had approximately 10 times the median wealth of black households (Killewald et al., 2017; Kochhar et al., 2011).

Homeownership rates are much lower for black adults than for white ones. Using the 2001 American Housing Survey (AHS), Krivo and Kaufman (2004) find that 73.3% of white household heads are homeowners, compared to just 45.5% of black household heads. The benefits to wealth from owning a home also differ by race. Killewald and Bryan (2016) find that the wealth benefits to homeownership in each year for African Americans are only 48% as large as those of white homeowners. In addition, homeownership has become riskier for black families than white families in recent years. Sharp and Hall (2014) find that black homeowners who purchased their homes prior to 1980 were no more likely to transition to renting than white homeowners, but in the 2000s the exit rate from homeownership was 50% higher for black families than for white families.

While upper- and middle-class black individuals are more likely to provide informal financial assistance to friends and extended family (O'Brien, 2012), black families are less successful in passing on their wealth to their children and grandchildren than white families. White individuals leave bequests and make inter-vivos transfers to their children at higher rates and in higher amounts on average than black individuals (Gittleman and Wolff, 2004; Menchik and Jianakoplos, 1997; Avery and Rendall, 2002; McKernan and Zhang, 2014). Pfeffer and Killewald (2015) find greater rates of downward intergenerational wealth mobility for black families compared to white families. They also find that provision for educational advantage has a more important role in intergenerational wealth transmission than inheritances.

There is reason to suspect that differences may exist between black and white families in their ability or willingness to help finance college for their children, even

after accounting for distributional differences in wealth and income, especially with respect to changes in housing wealth. Do (2012) examines the differences in the propensity to extract home equity across racial groups in the United States via home equity lines of credit and cash-out refinance loans and finds that non-hispanic black and hispanic homeowners are less likely to withdraw equity from their homes than non-hispanic white homeowners. One possible reason for this is that black home-owners may face credit constraints not faced by white home-owners. Charles and Hurst (2002) demonstrate that black mortgage applicants are almost twice as likely as comparable white applicants to be rejected, even after controlling for credit histories and household wealth. They also find that black households are less likely to apply for mortgages than comparable white households. Wheeler and Olson (2015) find that the gap in denial rates by race are highest where house prices are not rising rapidly. Others have found also found evidence consistent with discrimination against black families in lending practices for other markets, vehicles and businesses (Blanchflower et al., 2003; Cavalluzzo and Wolken, 2005; Charles and Stephens, 2008). Finally, it is possible that even in the absence of credit constraints, demand for withdrawing equity may be lower for black families due to unfamiliarity with treating houses as liquid assets, and other cultural differences (Deng et al., 2003; Gabriel and Rosenthal, 2005; Krivo and Kaufman, 2004).

In this paper we explore whether racial differences exist in the role that parental resources play in the college enrollment and eventual attainment of their children, and its financing. First, we identify black-white differences in the extent to which increases in parental income and parental housing wealth increase the likelihood that an adult child enrolls in college. We further explore the degree to which changes in income and housing wealth operate by increasing the prevalence and amounts of financial transfers from parents to children for college. Finally, we trace the differential effects by race of parental income and wealth through college enrollment

to consider how they affect the likelihood of graduation from college and enrolling in a post-graduate program.

To examine these issues, we use data from the 2013 Panel Study of Income Dynamics (PSID), which includes information on race, as well as family wealth and income. We take advantage of the Rosters and Transfers module, in which all parents in the PSID reported on the educational enrollment and attainment of their adult children, as well as any financial transfers they made to each child to help pay for college.

To properly identify the causal relationships between parental resources and educational outcomes such as college enrollment and graduation, as well as on financing decisions, we construct measures to use as instruments for parental housing wealth and parental income in the period just preceding the college enrollment and financing decisions of each child. These instruments consist of measures of changes in labor and housing market conditions local to each household that we argue are exogenous to enrollment, graduation, and parents' financial transfer decisions.

Consistent with prior work, we find evidence of positive effects of increases in both parental income and housing wealth on college enrollment for their children, as well as the likelihood that parents make financial transfers to help pay for their child's college. However, there are differences between white and black families in the significance and magnitude of these effects. Increases to parental income increase the likelihood of college enrollment for children of white parents but not for children of black parents, for whom we find a significant, though smaller, effect of increases in housing wealth on enrollment. For white families, increases to parents' income and wealth both raise the likelihood of parental transfers for college by similar amounts. Parental income also increases the probability of financial transfers for black parents, with an effect size approximately twice as large as for white parents. Increases to houseing wealth do not significantly affect the likelihood that black parents will fi-

nancially support their child's education via transfers. Consistent with these results, we find that increases to income for black parents are an important determinant of graduation for their children, raising the probability of completing a degree significantly. We find no such effect for white parents, but do estimate a smaller positive effect on the likelihood of graduation from increases to housing wealth.

While others have examined black-white differences in the financing of children in general, we look directly at parental financing of college in particular. This paper builds on previous work that has examined the effects of parental wealth and income on college attendance and graduation individually by considering them together. We are able to compare the relative importance of income and wealth for families facing the prospect of sending a child to college. Furthermore, by contrasting these effects by race, we identify racial differences in parents' use of housing wealth to help finance college as a key factor in their child continuing on to graduation. Finally, we take seriously the likelihood of selection due to unobserved differences between white and black families in our sample. Our instrumental variables strategy allows us to obtain plausible estimates of the causal effects of parental income and wealth.

The rest of the paper is organized as follows. In Section 3.2 we describe the PSID data and how we form the different samples and measures we use in our analysis. In Section 3.3 we describe a model for families' decisions about child college attendance and parent's financial transfers for their child's college education. We also describe a model for graduation from college and enrollment in a post-graduate program. We explain our estimation strategy for each of these models. In Section 3.4 we describe the results from estimating the models proposed in the previous section. We account for racial differences in the distribution of parental income and wealth to compare their effects on children's college attendance and parent's financing decisions between white and black families, and examine differences by parent's race and homeownership status. We conclude in Section 3.5.

3.2 The PSID Data

The PSID began with a sample of roughly 18,000 people in approximately 5,000 household units in 1968. All individuals in households recruited into the PSID in 1968 are said to have the PSID gene. Individuals who are born to or adopted by someone with the PSID gene acquire the gene themselves and are recruited to become members of the PSID sample for the rest of their lives. This genealogical design implies that the study provides data on a sample of extended families at each wave. The extended family in the PSID is incomplete because some children (particularly stepchildren and children who have left the PSID sample), and some parents (for example in-laws without the PSID gene) are not included in the sample. The 2013 Roster and Transfers Module was designed to complete the parent-adult child information in the PSID and to describe the transfers that parents and adult children make to one another.

3.2.1 The 2013 PSID Roster and Transfers Module

We use the Roster and Transfers Module of the 2013 PSID in which respondents (PSID heads and spouses) are asked to list and describe their adult children and stepchildren age 18 and older, as well as their parents, stepparents, and in-laws (including in-laws from long-term cohabiting relationships) and to report about financial and time transfer to and from their parents and adults children. Importantly for our purposes, parents report about the age and educational attainment of their adult children and about financial transfers for school they have given to each of their children since the age of 18. Both whether assistance was provided and the amount of assistance is included in the module. Respondents report about relationships and transfers with coresident and non-coresident children (see Schoeni et al. (2015) for a more complete description of the module).

3.2.2 Samples

Our sample starts with the parents and adult children reported in the 2013 Roster and Transfers Module. We are interested in two points in the lives of these adult children: the year in which the child turns 18 when decisions about college are made, and the year in which the child turns 24 when some of the consequences of financing college can be observed.

To create our main sample, we find the year in which the child turned 18 using the birth year in the Childbirth and Adoption History augmented by age reported in the Roster and Transfers Module. Using the Parent ID file augmented with the relationship information in the Roster and Transfers Module, we link each child with his or her father and mother. Because we need to determine the parents' housing wealth and household income at this point in the child's life, we restrict our sample of parent-child pairs to those in which the parents were present as a head or wife of the PSID in the year this child was age 18.[1] We also require that the year in which the child turned 18 is after 1998 (which corresponds to children in birth cohorts beginning in 1980) since some of the data elements we need in our analyses are only available starting in 1998.[2] We further restrict our sample to black parents and white parents, because of our focus on racial differences in children's college attendance and financing decisions, and the large number of both black and white parents in the PSID. We define race for parents using their responses to the question about their race in the 2013 PSID wave as follows: a parent household is defined as white if both the parent who is the head of the household and his or her spouse (if applicable) respond only "white" when asked to report their race. The parent household is defined as black if both the parent who is the head of the household

[1] If the parents are not a PSID head or wife in the year in which the child turns 18 we go back one year at a time until the child age 13 at which point we drop the child-parent pair.

[2] The housing price measure from Zillow which we used to construct a measure for changes to local housing markets had inadequate geographic coverage prior to this period.

and his or her spouse (if applicable) give "black" as one of their responses to the same question. All other parent households are dropped from the sample. A parent household is also dropped from the sample if they respond affirmatively when asked if they are ethnically hispanic. We include both parents who are renters as well as those who are home-owners in our sample. Finally, following Lovenheim (2011), we trim the top 1% of changes in house prices prior to the child turning 18. After all of these sample selections, we have a sample of $N = 3{,}724$ parent-child pairs with which to estimate the effect of parental wealth on college attendance and parental transfers for college, 1,841 white and 1,883 black. [3] For the outcome of college completion, we further limit the sample to children who attended college which yields a sample size of 1,502 parent-child pairs, 958 white and 544 black.

Table 3.1: Sample Size by Outcome and Race

Samples	White Parents	Black Parents	All Parents
Parent-Child Pairs for Analyses of:			
Child's College Choices & Amount of Transfer	1841	1883	3724
Whether Child Graduated from College	958	544	1502

Table 3.1 provides a summary of the sizes of these various samples that we use in our analysis below. In Table 3.2, we also present descriptive statistics of the demographic characteristics of the parents and children, measured at the time the children were age 18, of the sample of the 3,724 parent-child pairs used in our analysis of college education decisions.

[3] the high number of black families in our sample relative to white families is a result of PSID oversampling of black families in 1968, and subsequent efforts by the PSID to retain black families at the expense of other respondents. A more detailed explanation can be found in B.1

Table 3.2: Characteristics of Parents and College-Age Children in PSID, 1998-2013[1]

Variable	White	Black
Parent Characteristics when Child was Age 18		
Single Parent when Child Age 18	0.21	0.60
Parent HH Headed by Male	0.89	0.55
Age of parent House Head	46.42	43.47
Number of children under 16 in HH	1.93	2.00
Parent's Education:		
High school or less	0.22	0.24
Some College	0.41	0.59
College graduate	0.37	0.17
Child Characteristics		
Sex of child (male=1)	0.48	0.48
Year child turned 18[2]	2004.77	2004.55

[1] Statistics weighted using PSID family weights. Dollar amount is in 10K of 2013$.
[2] The range of years in which children turned 18 is 1998-2013

3.2.3 Measures

Below we describe how we construct the various measures used in our analyses. In later sections, we provide summary statistics.

College Attendance and Graduation: We measure college attendance and college graduation using the Roster and Transfers data. We consider a child to have attended college if the parents report in the Roster and Transfers data that the child has attended some college or has a college degree. This measure is somewhat different from the previous literature (Lovenheim, 2011; Lovenheim and Reynolds, 2013; Cooper and Luengo-Prado, 2015) which uses the annual PSID data to determine enrollment. The benefit of the measure from the Roster and Transfers data is that is considerably easier to identify students who enroll in but do not complete college. This is important to understanding the potential difference in effects of attending vs. graduating from college. We measure college graduation by a parental report that the child's highest level of educational attainment is college graduate or more.

Financial Transfers for College: Parents are considered to have given a financial transfer to a child for educational expenses if they report having done so in the long-term transfers question in the Roster and Transfers Module. We eliminate the small number of cases in which parents report that their child has educational attainment below "some college" and report having given a transfer for post-secondary educational expenses. We measure the amount that parents report giving to their child in 2013$.[4]

Parental Housing Wealth and Income: Over the entire span of the PSID, heads of households or their proxy are asked whether they are a homeowner and, if they are, to provide an estimate of the value of their home and the remaining balance, if any, on their home mortgages and/or home equity loans. Mortgage debt includes all primary and secondary mortgages, along with home equity loans and lines of credit on the individual's primary residence. Then, we define an estimate of the parents net home equity as the reported market value of their home less any remaining mortgage balances. Parental income is measured by total family income reported in the annual PSID family data.

3.3 Identifying Effects of Parental Wealth & Income on Children's College Attendance and Its Financing, College Graduation, and Post-Graduate Enrollment by Race

In this section, we examine children's college attendance decisions and parents' role in helping to finance their children's choices. Specifically, we are first interested

[4] We note that the decision to measure the amount of transfers in 2013$ is not straightforward. Though parents were asked the question on amounts of transfers in 2013, it is not clear whether the reported amounts in terms of current dollars or the dollar value(s) at the time the transfers were made. We have re-run our specifications of regressions for the effects of parental housing wealth and income on the amount of transfers given to support a child's college education under either of these two assumptions about parental reporting. While the magnitudes of the corresponding coefficients differed, none of the inferences we make below were affected. Accordingly, we only present results under the assumption that parents reported the amounts of these transfers in current (2013) dollars.

in whether there are racial differences in the extent to which changes in the levels of wealth and income of parents increase the likelihood of attending college for their children, both with and without parental financial assistance. We also examine the the effects of parental income and wealth on the likelihood a college student graduates and subsequently enrolls in a graduate program. We begin by defining the notation for college attendance and parental financing as well as parental income and housing wealth and comparing the empirical distributions of parental wealth and income across college attendance and financing decisions between black and white familes in our sample. We then propose a model of college attendance and parental financing and describe our econometric strategy for estimating the causal impact of parental wealth and income on the decision of children to attend college and the decision of parents to help finance it and discuss our findings. We explain the measures we construct to use as instrumental variables in our estimation strategy. Finally, we establish a model of college graduation and enrollment in a post-secondary program and describe our strategy to estimate it.

3.3.1 Defining Children's College Attendance and Parental Financing Choices

We define the following variables to characterize the college attendance and parental financing decisions for the j^{th} child of the i^{th} parent when the child is age 18:

$$EduFin0_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ did } \textit{not} \text{ enroll in college,} \\ 0, & \text{otherwise.} \end{cases} \tag{3.1}$$

$$EduFin1_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ enrolled in college \& parents didn't help pay,} \\ 0, & \text{otherwise.} \end{cases} \tag{3.2}$$

and

$$EduFin2_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ enrolled in college \& parents did help pay,} \\ 0, & \text{otherwise.} \end{cases} \tag{3.3}$$

where $EduFin0_{ij,18_j} + EduFin1_{ij,18_j} + EduFin2_{ij,18_j} = 1$.

Conditional on $EduFin2_{ij,18_j} = 1$, we can measure the *amount of financial help* parent i provided to child j in support of the child's college attendance. Denote this amount as $CollTrans_{ij,18_j}$.

Table 3.3: Child's College Enrollment Choices and Parental Transfers for College among Homeowning Parents and College Age Children in PSID, 1997-2015[1]

Variable	White	Black
Child does not enroll (EduFin0)	0.38	0.62
Child enrolls, no transfer (EduFin1)	0.27	0.29
Child enrolls, transfer (EduFin2)	0.35	0.09
Amount of Transfer (CollTrans)[2]	\$3.20	\$0.82

[1] Statistics weighted using PSID family weights.
[2] Conditional on those students who attended college and received a financial transfer from their parents for their college education ($EduFin2 = 1$). Dollar amount is in 10K of 2013\$.

Table 3.3 shows the distribution of $EduFin$ for both white and black families in our sample. We see large differences in college enrollment decisions by race: 62% of black children do not attend college, compared to only 38% of children with white parents. [5] We also observe differences in patterns of college financing. Overall, 9% of black children receive financial transfers from their parents to help pay for their education, while 35% of white children do. This means that 56% of all white children and only 24% of all black children who attend college do so with financial support from their parents. Conditional on their child attending college and parents making

[5] This gap is larger than that found in some other surveys. A larger proportion of white children in our sample enroll in college than documented by McFarland et al. (2018), as our measurement of college attendance will include some individuals who enroll in college after their early 20s.

a financial transfer to them for school, white parents give more money on average. The mean transfer amount is $32,000 from white parents, compared to $8,200 from black parents.

As mentioned above, we are interested in the role that parents' financial resources play in the decisions of their child to attend college and the parents' decision to help finance it, with a particular emphasis on differences by parental race. To begin, we characterize the housing measures we construct from the PSID data. Let $MktValue_{imt_{18,j}}$ denote the *parents' estimated market value of their home* (measured in 2013 dollars) located in market m (which is in state s) in the year in which child j was age 18 (t_{18_j}). Further, let $MortBal_{imt_{18_j}}$ denote the remaining balances on parents' home mortgages and home equity loans as of year t_{18_j}, again in 2013$. Then, we define an estimate of the parents *(net) home equity* as:

$$H_{imt_{18_j}} = MktValue_{imt_{18_j}} - MortBal_{imt_{18_j}}. \tag{3.4}$$

Let $Y_{imt_{18_j}}$ denote the parent i's *total household income* in year t_{18_j} when they were residing in local labor market m. We include both home-owners and renters in our analysis. We assign parents who rent their homes a value of zero for net home equity ($H_{imt_{18_j}}$). Let $I^{HO}_{imt_{18_j}}$ be an indicator variable equal to 1 if the parents own a home and 0 if the parents are renters.

In addition to the sizable racial differences in college attendance and financing decisions, we also observe disparities by race in the wealth and resources available to parents when their child is 18. Table 3.4 shows weighted means for home value, net home equity, income, and total wealth of parents in our sample by race. We also show rates of home-ownership, working and unemployment, and the incidence of home equity loans. The differences by race here are also stark. We show these values

for our entire sample, as well as calculated for the portion of our sample in each college attendance and financing category (e.g. $EduFin0$, $EduFin1$, $EduFin2$).

Table 3.4: Parents' Wealth and Resources when Child was Age 18[1]

Variable	Full Sample	EduFin0 (No Coll)	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer
White Parents				
Home-owner ($I^{HO}_{imt_{18_j}}$)	0.80	0.66	0.82	0.94
Home Value ($MktValue_{18}$)[2]	\$18.26	\$12.26	\$16.00	\$24.28
Net Equity ($H_{imt_{18j}}$)[2]	\$9.74	\$5.64	\$8.26	\$13.83
Income ($Y_{imt_{18j}}$)	\$9.49	\$6.22	\$9.06	\$13.34
Total Wealth	\$32.00	\$17.55	\$24.65	\$52.87
Working	0.89	0.84	0.90	0.93
Unemployed	0.03	0.06	0.03	0.00
Home Equity Loan[2]	0.14	0.09	0.16	0.17
Black Parents				
Home-owner ($I^{HO}_{imt_{18_j}}$)	0.45	0.40	0.53	0.58
Home Value ($MktValue_{18}$)[2]	\$8.39	\$7.31	\$9.58	\$10.09
Net Equity ($H_{imt_{18j}}$)[2]	\$3.28	\$2.85	\$3.68	\$4.17
Income ($Y_{imt_{18j}}$)	\$4.80	\$4.08	\$5.90	\$6.24
Total Wealth	\$4.50	\$4.02	\$4.86	\$6.51
Working	0.73	0.67	0.81	0.87
Unemployed	0.10	0.13	0.04	0.02
Home Equity Loan[2]	0.08	0.09	0.05	0.13

[1] Statistics weighted using PSID family weights. Dollar amount is in 10K of 2013\$.
[2] Conditional on parents being home-owners.

White parents have higher income and wealth on average than black parents. The mean household income for all white parents is \$97,400 compared to only \$48,000 for black parents. Similarly, white parents have an average home value of \$182,600 with \$97,400 in net equity compared to only \$83,900 and \$32,800 for black parents, respectively. This difference is even more pronounced among parents who help pay for their child's college. For such parents ($EduFin2 = 1$), the difference between white and black parents for income (\$133,400 vs. \$62,400), home value (\$242,800 vs. \$100,900), and net equity (\$138,300 vs. \$41,700) are larger than the difference

between black and white families overall. White parents of children who attend college with financial support have $55,700 [= $138,300 - $82,600] more in net equity when their child is age 18 than those whose children attend college without financial support, and black parents have only $4,900 [= $41,700 - $36,800] more. Together, these suggest that housing wealth may play a more important role for white parents than black parents in the decision to provide financial transfers to their children for college.

We also see large differences in home-ownership by race. 80% of white parents with college-age children own homes, compared to only 45% of black parents. Home-ownership appears to be more closely linked to parental financial support for college among white parents than black. 94% of white children who receive transfers for college have parents who are home-owners, compared to only 58% of black children.

Prior research suggests that for many parents, a key mechanism for helping fund college education for children is the ability to extract wealth from their home via a home equity loan or line of credit (Lovenheim and Reynolds, 2013; Hotz et al., 2018). When comparing black parents in our sample who help pay for their child's college ($EduFin2 = 1$) with those whose children attend college without parental support ($EduFin1 = 1$), we see that they are very similar in income ($62,400 vs. $59,000), home value ($100,900 vs. $95,800), and net equity ($41,700 vs. $36,800). However, black parents who help pay for college are nearly 3 times as likely to hold a home equity loan as parents who do not (13% vs. 5%). This suggests that one important difference between black parents who are able to pay for college for their children and those who aren't is the ability to obtain such a loan. White parents exhibit no such difference in the incidence of home equity loans between those who pay for college (17%) and those whose children attend college without their support (16%). Here the difference between the two groups is that parents who help pay for college earn more ($133,400 vs. $90,600), and have more valuable homes ($242,800

vs. $160,000) with greater equity ($138,300 vs. $82,600) than those who do not. In short, this evidence suggests that the role of parental income and housing wealth may be quite different, depending on whether a family is white or black. For white families, having greater resources in the form of income and housing wealth appear to be a crucial predictor of whether they choose to help finance college for their children. For black parents, access to a home equity loan may be a more significant factor. There are several possibilities for why many black families may face obstacles to obtaining a home equity loan (e.g. discrimination, redlining, etc.) that white families with similar income and wealth may not experience. This, along with the large overall racial differences in the distribution of income and wealth could help explain why college attendance and financing patterns are so different by race.

To help identify the extent of race differences in how the likelihood of attending college and the prevalence of financial transfers from parents for college increases with higher levels of parental income and housing wealth, we can examine differences in behavior between white and black families with similar levels of resources. First, we calculate income and net housing equity quartiles from our sample, using PSID family weights. By classifying each parent in our sample by the income and net equity quartile they fall into, we can see how rates of college attendance and financing, transfer amounts, and incidence of home equity loans vary across the joint income and wealth distribution. Table 3.5 shows the percentage of families in each income-equity quartile cross where the child does not enroll ($EduFin0$), enrolls with no financial transfer ($EduFin1$), and enrolls with a transfer ($EduFin2$). We also display mean transfer amounts and percentage of families with a home equity loan for each income/wealth category. These are shown separately for white parents and black parents, with the third section showing the white-black difference for each cell.

We see similar patterns for college attendance for both black and white families. Broadly, the percentage of children that do not enroll in college ($EduFin0$) falls as

income and net equity quartile increase. The change is more dramatic for white families than black families. For parental financing, we see evidence of differing behavior by race. At nearly every level of income and net equity, a higher proportion of white families help finance their child's education than black families ($EduFin2$). This difference is most pronounced among the wealthiest and highest earning parents, where 69% of white parents help pay for their child's college education compared to only 29% of black parents, a difference of 40 percentage points.

For white parents, those with higher equity are more likely to have their child enroll in college with a transfer than those with lower equity, holding income quartile constant. The rate for parents at the lowest income quartile rises from 4% of those in the lowest net equity category to 29% for those in the highest income category. This pattern is also present for parents in the 2nd (14% to 35%), 3rd (20% to 54%), and 4th (43% to 69%) income quartiles. This is not the case for black families. The relationship between net equity quartile and rates of financial assistance for college are much weaker. Only for families in the 3rd income quartile does the rate of financial transfers rise by more than 4 percentage points from the lowest to the highest net equity levels. For black parents in the lowest income quartile, transfer rates actually fall, from 5% to 1%. From this it appears that housing wealth has a much stronger relationship with the ability for parents to help finance college for their children for white families than black ones.

Table 3.5 also indicates that for black families at the highest income levels, rates of college enrollment *without* parental financial assistance ($EduFin1$) increase steadily and dramatically with housing wealth. The percentage of black families in this category rises from 37% at the lowest net equity quartile, to 40%, 58%, and 64% at the 2nd, 3rd, and 4th equity quartiles, respectively.

Table 3.5: College Attendance and Financing Rates, Mean Transfer Amounts, and Home Equity Loan Rates by Income and Net Equity Quartile [1]

Net Equity Quartile	Income Quartile *White Parents* 1st	2nd	3rd	4th	*Black Parents* 1st	2nd	3rd	4th	*Difference* 1st	2nd	3rd	4th
Child does not enroll (EduFin0)												
1st	0.69	0.67	0.51	0.26	0.73	0.65	0.56	0.36	-0.04	0.02	-0.05	-0.10
2nd	0.66	0.57	0.38	0.25	0.66	0.50	0.50	0.51	0.00	0.07	-0.12	-0.26
3rd	0.68	0.52	0.30	0.18	0.76	0.65	0.45	0.20	-0.08	-0.13	-0.15	-0.02
4th	0.35	0.34	0.16	0.11	0.95	0.61	0.31	0.07	-0.60	-0.27	-0.15	0.04
Child enrolls, no transfer (EduFin1)												
1st	0.27	0.20	0.29	0.31	0.22	0.24	0.40	0.37	0.05	-0.04	-0.11	-0.06
2nd	0.33	0.27	0.32	0.40	0.25	0.38	0.36	0.40	0.08	-0.11	-0.04	0
3rd	0.22	0.26	0.36	0.25	0.18	0.25	0.45	0.58	0.04	0.01	-0.09	-0.33
4th	0.36	0.31	0.31	0.20	0.04	0.24	0.34	0.64	0.32	0.07	-0.03	-0.44
Child enrolls, transfer (EduFin3)												
1st	0.04	0.14	0.20	0.43	0.05	0.11	0.04	0.27	-0.01	0.03	0.16	0.16
2nd	0.01	0.16	0.30	0.35	0.09	0.13	0.14	0.09	-0.08	0.03	0.16	0.26
3rd	0.11	0.22	0.35	0.57	0.06	0.10	0.10	0.22	0.05	0.12	0.25	0.35
4th	0.29	0.35	0.54	0.69	0.01	0.15	0.34	0.29	0.28	0.20	0.20	0.40
Amount of Transfer (CollTrans)[2]												
1st	0.02	0.07	0.42	1.33	0.02	0.04	0.05	0.10	0.00	0.03	0.37	1.23
2nd	0.02	0.13	0.37	1.20	0.27	0.06	0.12	0.08	-0.25	0.07	0.25	1.12
3rd	0.08	0.36	0.74	1.76	0.01	0.08	0.06	0.29	0.07	0.28	0.68	1.47
4th	1.08	0.62	1.39	3.66	0.00	0.12	0.01	0.04	1.08	0.50	1.38	3.62
Parent Has a Home Equity Loan when child is age 18												
1st	0.01	0.01	0.04	0.09	0.00	0.01	0.00	0.04	0.01	0.00	0.04	0.05
2nd	0.05	0.10	0.15	0.18	0.06	0.12	0.13	0.03	-0.01	-0.02	0.02	0.15
3rd	0.01	0.11	0.15	0.16	0.01	0.01	0.2	0.14	0.00	0.10	-0.05	0.02
4th	0.11	0.05	0.20	0.18	0.00	0.12	0.01	0.04	0.11	-0.07	0.19	0.14

[1] Statistics weighted using PSID family weights.
Income and net equity quartile cutpoints were determined from the full sample of white and black parents pooled together. The cutpoints by income quartile are $37.4k (1st quartile), $68k (2nd quartile), $107.1k (3rd quartile), and $1,021k (4th quartile). For net equity the cutpoints are $0 (1st quartile), $27.4k (2nd quartile), $79.2k (3rd quartile), and $2,062k (4th quartile).
[2] Dollar amount is in 10K of 2013$.

3.3.2 Modeling Children's College Attendance and Parental Financing Choices

To model parental-child college and financing decisions, let the utility/payoff for $EduFink_{ij,18_j}$ be denoted by $U^*_{kijm,18_j}$ and assume that choice $k = 0$ is the base category. The payoff functions for parent i of child j made when the child is age 18

are given by:

$$
\begin{aligned}
U_{kijm,18_j} = {} & \lambda^U_{k0} + \lambda^U_{k1} Y_{imt_{18_j}} + \lambda^U_{k2} H_{imt_{18_j}} I^{HO}_{imt18_j} + \lambda^U_{k3} Y_{imt_{18_j}} I^{HO}_{imt18_j} \\
& + \lambda^U_{k4} Y_{imt_{18_j}} Black_i + \lambda^U_{k5} Y_{imt_{18_j}} I^{HO}_{imt18_j} Black_i + \lambda^U_{k6} H_{imt_{18_j}} I^{HO}_{imt18_j} Black_i \\
& + \lambda^U_{k7} I^{HO}_{imt18_j} + \lambda^U_{k8} Black_i + \lambda^U_{k9} I^{HO}_{imt18_j} Black_i \\
& + \boldsymbol{\lambda}^U_{k10} \boldsymbol{X}_{ij} + \boldsymbol{\lambda}^U_{k11} \boldsymbol{M}_{mt_{18_j}} + \phi^U_{kt_{18_j}} + \delta^U_{ks} + \varepsilon^U_{kijm,18_j},
\end{aligned}
\tag{3.5}
$$

for $k = 0, 1, 2$, where the $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are parental wealth and income respectively, $I^{HO}_{imt18_j}$ is an indicator variable equal to 1 if the parent owns a home, $Black_i$ is an indicator variable equal to 1 if the parents are black, $\boldsymbol{X}_{ij}$ is a vector of demographic characteristics of parents i and their j^{th} child, $\boldsymbol{M}_{mt_{18_j}}$ is a vector of time-varying characteristics of location m in year t_{18_j}, $\phi_{t_{18_j}}$ and δ_s are year and state-of-residence *fixed effects*, respectively, and $\varepsilon_{kijm,18_t}$ are choice-specific unobserved parent and child traits. White parents who rent their place of residence is the omitted housing category in these and the following specifications.

We include in $\boldsymbol{X}_{ij}$ a set of demographic characteristics including the age, marital status, race, and education of the parent. Also included are a set of variables describing the family structure of the child's household at age 18 including whether the household is headed by a single-female, the number of children in the household under age 16, whether there is a child in the household who is less than five years older than child j, whether there is a child in the household who is less than five years younger than child j, and the gender of child j.

We include in $\boldsymbol{M}_{mt_{18_j}}$ the average weekly wage and employment rate in market m in year t_{18_j}, where the latter variables are taken from the Quarterly Census of Employment and Wages (QCEW). We use a share-weighting approach to make the average weekly wage more accurately reflect the labor market teenage workers would face if they do not attend college. We use the Current Population Survey to calculate the composition of industries that teenagers are employed in nationally in each

year and apply these weights to local industry-specific wages. We also control for the college-wage premium for younger workers directly. Following Lovenheim and Reynolds (2013) we use data from the Current Population Survey to calculate the college-wage premium for young workers in the state, s, in which market m is located in year t_{18_j} as the ratio of hourly wages of 25 - 40 year olds with a bachelor's degree (BA) to the hourly wages of 25 - 40 year olds whose highest level of educational attainment is a high school diploma. We also include the college-associate degree wage premium calculated as above but using individuals with an associate's degree as the comparison group. As long as high-skilled labor demand is not highly localized, these state-level measures control for the demand for high-skilled vs. low-skilled labor for younger workers.

We characterize the optimal college/financing choice for child j, $k^{\dagger}$, as follows:

$$k_i^{\dagger} = \arg\max_k U_{kijm,18_j}, k = 0, 1, 2. \tag{3.6}$$

Assuming that the random variable, $\varepsilon^U_{kijm,18_j}$, has a Type II extreme value distribution and assuming that we treat $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ as exogenous to child j's college enrollment and parental financing decisions, it follows that the model of the college attendance and its financing choice can be estimated as a multinomial logit model.

This modeling approach is an extension of the approach of Hotz et al. (2018) to incorporate renters into the analysis along with homeowners, and to allow for differing effects of parental income and wealth by race. We also allow for the effect of parental income to vary based on the home-ownership status of parents. Housing wealth is zero for renters, and can therefore have no effect.

The assumption that each of $Y_{imt_{18_j}}$, $H_{imt_{18_j}} I^{HO}_{imt18_j}$, $Y_{imt_{18_j}} I^{HO}_{imt18_j}$, $Y_{imt_{18_j}} Black_i$, $Y_{imt_{18_j}} I^{HO}_{imt18_j} Black_i$, and $H_{imt_{18_j}} I^{HO}_{imt18_j} Black_i$ are exogenous is a strong one. Accordingly, we wish to allow for the potential endogeneity of these six variables in the estimation of the payoff functions in (3.5). To deal with the endogeneity of these

variables, we use a control function estimator (Blundell and Powell, 2003) applied to the multinomial logit specification (Petrin and Train, 2010; Wooldridge, 2014). This estimator can be implemented in two stages. In the first stage, we regress the endogenous variables $Y_{imt_{18_j}}$, $H_{imt_{18_j}} I^{HO}_{imt18_j}$, $Y_{imt_{18_j}} I^{HO}_{imt18_j}$, $Y_{imt_{18_j}} Black_i$, $Y_{imt_{18_j}} I^{HO}_{imt18_j} Black_i$, and $H_{imt_{18_j}} I^{HO}_{imt18_j} Black_i$ on exogenous regressors, including the exogenous variables, $\boldsymbol{X}_{ij}$ and $\boldsymbol{M}_{mt_{18_j}}$ in (3.5) and year and state-of-residence fixed effects, as well as a vector of instrumental variables, $\boldsymbol{Z}_{imt_{18_j}}$ (which we define in the next section) to account for the endogeneity of $Y_{imt_{18_j}}$, $H_{imt_{18_j}} I^{HO}_{imt18_j}$, $Y_{imt_{18_j}} I^{HO}_{imt18_j}$, $Y_{imt_{18_j}} Black_i$, $Y_{imt_{18_j}} I^{HO}_{imt18_j} Black_i$, and $H_{imt_{18_j}} I^{HO}_{imt18_j} Black_i$. That is, these first-stage regressions are:

$$H_{imt_{18_j}} I^{HO}_{imt18_j} = \boldsymbol{\pi}^H_1 \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}^H_2 \boldsymbol{X}_{ij} + \boldsymbol{\pi}^H_3 \boldsymbol{M}_{mt_{18_j}} + \phi^H_{t_{18_j}} + \delta^H_s + \nu^H_{imt_{18_j}} \quad (3.7)$$

$$H_{imt_{18_j}} I^{HO}_{imt18_j} Black_i = \boldsymbol{\pi}^H_1 \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}^H_2 \boldsymbol{X}_{ij} + \boldsymbol{\pi}^H_3 \boldsymbol{M}_{mt_{18_j}} + \phi^H_{t_{18_j}} + \delta^H_s + \nu^H_{imt_{18_j}} \quad (3.8)$$

$$Y_{imt_{18_j}} = \boldsymbol{\pi}^Y_1 \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}^Y_2 \boldsymbol{X}_{ij} + \boldsymbol{\pi}^Y_3 \boldsymbol{M}_{mt_{18_j}} + \phi^Y_{t_{18_j}} + \delta^Y_s + \nu^Y_{imt_{18_j}} \quad (3.9)$$

$$Y_{imt_{18_j}} I^{HO}_{imt18_j} = \boldsymbol{\pi}^Y_1 \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}^Y_2 \boldsymbol{X}_{ij} + \boldsymbol{\pi}^Y_3 \boldsymbol{M}_{mt_{18_j}} + \phi^Y_{t_{18_j}} + \delta^Y_s + \nu^Y_{imt_{18_j}} \quad (3.10)$$

$$Y_{imt_{18_j}} Black_i = \boldsymbol{\pi}^Y_1 \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}^Y_2 \boldsymbol{X}_{ij} + \boldsymbol{\pi}^Y_3 \boldsymbol{M}_{mt_{18_j}} + \phi^Y_{t_{18_j}} + \delta^Y_s + \nu^Y_{imt_{18_j}} \quad (3.11)$$

$$Y_{imt_{18_j}} I^{HO}_{imt18_j} Black_i = \boldsymbol{\pi}^Y_1 \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}^Y_2 \boldsymbol{X}_{ij} + \boldsymbol{\pi}^Y_3 \boldsymbol{M}_{mt_{18_j}} + \phi^Y_{t_{18_j}} + \delta^Y_s + \nu^Y_{imt_{18_j}} \quad (3.12)$$

One then retrieves the residuals from these regressions, which we denote as $\widehat{\nu}^{HI^{HO}}_{imt_{18_j}}$, $\widehat{\nu}^{HI^{HO}Black}_{imt_{18_j}}$, $\widehat{\nu}^{Y}_{imt_{18_j}}$, $\widehat{\nu}^{YI^{HO}}_{imt_{18_j}}$, $\widehat{\nu}^{YBlack}_{imt_{18_j}}$, and $\widehat{\nu}^{YI^{HO}Black}_{imt_{18_j}}$ respectively. In the second stage, we estimate a multinomial logit model where we include $\widehat{\nu}^{HI^{HO}}_{imt_{18_j}}$, $\widehat{\nu}^{HI^{HO}Black}_{imt_{18_j}}$, $\widehat{\nu}^{Y}_{imt_{18_j}}$, $\widehat{\nu}^{YI^{HO}}_{imt_{18_j}}$, $\widehat{\nu}^{YBlack}_{imt_{18_j}}$, and $\widehat{\nu}^{YI^{HO}Black}_{imt_{18_j}}$ as additional regressors, with separate coefficients, in the payoff functions in (3.5). To account for the estimation error in $\widehat{\nu}^{HI^{HO}}_{imt_{18_j}}$, $\widehat{\nu}^{HI^{HO}Black}_{imt_{18_j}}$, $\widehat{\nu}^{Y}_{imt_{18_j}}$, $\widehat{\nu}^{YI^{HO}}_{imt_{18_j}}$, $\widehat{\nu}^{YBlack}_{imt_{18_j}}$, and $\widehat{\nu}^{YI^{HO}Black}_{imt_{18_j}}$ and the quasi-ML nature of es-

timation in the second stage, we adjust the estimation of the variance-covariance matrix of the λs as characterized in Wooldridge (2014). We use bootstrap to calculate these standard errors.

Finally, conditional on $EduFin2 = 1$, we can estimate the impacts of parental housing wealth and household income on the amount of the parents' transfer, $CollTrans_{imt_{18_j}}$. Mimicking the specification of payoffs in (3.5), we estimate the following OLS regression:

$$\begin{aligned} CollTrans_{imt_{18_j}} &= \lambda_0^T + \lambda_{k1}^T Y_{imt_{18_j}} + \lambda_{k2}^T H_{imt_{18_j}} I_{imt18_j}^{HO} + \lambda_{k3}^T Y_{imt_{18_j}} I_{imt18_j}^{HO} \\ &+ \lambda_{k4}^T Y_{imt_{18_j}} Black_i + \lambda_{k5}^T Y_{imt_{18_j}} I_{imt18_j}^{HO} Black_i + \lambda_{k6}^T H_{imt_{18_j}} I_{imt18_j}^{HO} Black_i \\ &+ \lambda_{k7}^T I_{imt18_j}^{HO} + \lambda_{k8}^T Black_i + \lambda_{k9}^T I_{imt18_j}^{HO} Black_i \\ &+ \boldsymbol{\lambda}_{k10}^T \boldsymbol{X}_{ij} + \boldsymbol{\lambda}_{k11}^T \boldsymbol{M}_{mt_{18_j}} + \phi_{kt_{18_j}}^T + \delta_{ks}^T + \varepsilon_{kijm,18_j}^T, \end{aligned} \tag{3.13}$$

where all of the control variables are the same as described above but we use MSA level fixed effects for urban residents and state level fixed effects for rural residents instead of state-level fixed effects. To account for the potential endogeneity of $Y_{imt_{18_j}}$, $H_{imt_{18_j}} I_{imt18_j}^{HO}$, $Y_{imt_{18_j}} I_{imt18_j}^{HO}$, $Y_{imt_{18_j}} Black_i$, $Y_{imt_{18_j}} I_{imt18_j}^{HO} Black_i$, and $H_{imt_{18_j}} I_{imt18_j}^{HO} Black_i$ in (3.13), we employ an instrumental variables estimator (2SLS), using the same vector of instruments, $\boldsymbol{Z}_{imt_{18_j}}$, used in the control function estimator of the parameters in the payoff functions in (3.5) which we describe next.

3.3.3 Instrumental Variables: Changes in Local Housing Prices & Wages

As noted above, we seek to instrument for parents' housing wealth and income, accounting for race and difference in home-ownership status, in the estimation of the payoff functions for the college education and financing choices parents make for their jth child. The variables we instrument for are $Y_{imt_{18_j}}$, $H_{imt_{18_j}} I_{imt18_j}^{HO}$, $Y_{imt_{18_j}} I_{imt18_j}^{HO}$, $Y_{imt_{18_j}} Black_i$, $Y_{imt_{18_j}} I_{imt18_j}^{HO} Black_i$, and $H_{imt_{18_j}} I_{imt18_j}^{HO} Black_i$. In this section, we de-

scribe the variables we use as instruments (Z) in our analyses and how they are constructed.

We use changes in local housing market prices and changes in labor market wages to construct our instruments. In particular, we construct measures of the change in the parents' housing wealth and parental income immediately before child j reaches age 18 to serve as instrumental variables for parental housing wealth and income in the estimation of our college attendance and financing models and our estimation of the effects of these decisions on subsequent educational outcomes described in Section 3.3.4. In spirit of the approach in Lovenheim and Reynolds (2013), we use changes in market-level measures of average housing values in the local market in which parents resided in the year in which the child was age 16, i.e., in year t_{16_j}. We use lagged values of changes in local market conditions for two reasons.

First, we want to to avoid the possible endogenous decision that parents may make to move to a different locality (market) at the time of their child's college decision, possibly to improve either their ability to finance the costs of college, e.g., they sell a more expensive home, take the equity from that home to pay for college and move to a less expensive home, or to reduce the cost of the college their child may attend, e.g., moving closer to a college or to a state that charges lower tuition.

Second, one might expect that parents base their assessment of whether they can use the equity in their home as collateral for a loan to pay for their children's college education (via a home equity loan, for example) based on any changes in local housing values one or two years prior to the actual decision, rather than based on what happens to housing values in the year when their child would be going to college. We note that this strategy of using changes in local housing values a few years prior to the child's college decision is similar to the one used by Lovenheim (2011) and Lovenheim and Reynolds (2013) in their studies of the effects of parental housing wealth on children's decisions to attend college. Finally, we note that we use

the same strategy when constructing measures of the changes in local labor market conditions that may be expected to affect their personal income.

More precisely, our instrument for changes in local housing values is constructed as follows. For the locality, m, in which parents reside in year $t_{16,j}$, we obtain housing price indices, HPI_{mt}, from external data sources to construct the percentage change in local housing values. Where possible, i.e., where we have data on local housing prices, we define the local housing market at the zip code level and, where possible, we use housing price indices constructed by Zillow. For zip codes where a Zillow price index is not available in year $t_{16,j}$, we use the Zillow index for the county in which the parents/child reside in that year. When a price index is not available for the parents' county of residence, we use the price index of the MSA- or state-of-residence. Finally, for some years and locations in which the parents in our data reside in markets not covered by Zillow data, we make use of the housing price index constructed by the Federal Housing Finance Agency (FHFA) as our measure of HPI_{mt}. With the resulting indices, we construct the percentage change in this index over a 4-year period centered on year t_{16_j},

$$\frac{HPI_{mt_{18_j}} - HPI_{mt_{14_j}}}{HPI_{mt_{14_j}}}. \tag{3.14}$$

We note that by using percentage changes in housing price indices, HPI_{mt}, rather than simple changes, we minimize any problems of non-comparability of the Zillow and FHFA housing price indices.[6] We then "scale" this percentage change by the net home equity the parents report in year t_{16_t} to form our housing market instrument:

$$\Delta HPI_{mt_{18_j}} \equiv H_{imt_{16_j}} \left[\frac{HPI_{mt_{18_j}} - HPI_{mt_{14_j}}}{HPI_{mt_{14_j}}} \right]. \tag{3.15}$$

We note that we found that trimming the changes affects the precision of our results.

[6] We trimmed these changes when they were exceedingly large in absolute value.

For our instrumental variable for local labor market conditions, we use data from the QCEW to obtain the average annual wages in each county, m, in each year, t. We then construct average wages by county-of-residence of parents for the years around when their child was age 16, i.e., t_{16_j}. We denote these average wage measures by $\overline{W}^P_{mt}$. We then construct the percentage changes in these average wages, i.e.,

$$\frac{\overline{W}^P_{mt_{18_j}} - \overline{W}^P_{mt_{14_j}}}{\overline{W}^P_{mt_{14_j}}}, \tag{3.16}$$

and scale it by parent's annual income in year $t_{16,j}$ to construct the following instrumental variable:

$$\Delta W^P_{mt_{18_j}} \equiv Y_{imt_{16_j}} \left[\frac{\overline{W}^P_{mt_{18_j}} - \overline{W}^P_{mt_{14_j}}}{\overline{W}^P_{m,t_{14_j}}} \right]. \tag{3.17}$$

Taking these two instruments $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$, we interact them with race $Black_i$ and home-ownership status $I^{HO}_{imt_{18_j}}$ to obtain enough instrumental variables to ensure identification. Thus, our vector of instruments is given by:

$$\begin{aligned} \boldsymbol{Z}_{imt_{18_j}} \equiv (&\Delta HPI_{mt_{18_j}} I^{HO}_{imt18_j}, \Delta HPI_{mt_{18_j}} I^{HO}_{imt18_j} Black_i, \Delta W^P_{mt_{18_j}}, \\ &\Delta W^P_{mt_{18_j}} I^{HO}_{imt18_j}, \Delta W^P_{mt_{18_j}} Black_i, \Delta W^P_{mt_{18_j}} I^{HO}_{imt18_j} Black_i), \Delta HPI_{mt_{18_j}}) \end{aligned} \tag{3.18}$$

3.3.4 Modeling Children's College Attainment

As noted in Section 3.2.3, we use information on completed schooling reported in the 2013 PSID Roster and Transfers Module to form measures of whether each child j of parent i that attended college at age 18 graduated from college, which we denote by dummy variable $Grad_{ij,18_j}$, and whether they enrolled in any post-baccalaureate education, denoted by the dummy variable $PostGrad_{ij,18_j}$.

Table 3.6 shows the mean values for each of the measures described above for the children in our family. Means are shown separately by race of each child's parents, for all college attendees, for children who attend college without parental support ($EduFin1$), and for children who attend college and receive a financial transfer from their parents ($EduFin2$). Here we again see disparities between children of white and black parents. 21% of all children from white families in our sample graduate from college, while only 8% of children from black families graduate.[7] Not all of this is explained by differing rates of enrollment, as among children who enroll in college, 34% of white children graduate, compared to only 22% of black children. Children from white families are more likely to enroll in post-graduate studies.

Table 3.6: College Graduation, Post-Graduate Enrollment, Annual Tuition, Types of College, and College Quality[1]

	Full Sample	Attended College	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer
White Parents				
Graduated from College $(Grad)^2$	0.21	0.34	0.33	0.35
Enrolled in Post-Graduate Studies $(PostGrad)^2$	0.07	0.11	0.11	0.10
Black Parents				
Graduated from College $(Grad)^2$	0.08	0.22	0.22	0.19
Enrolled in Post-Graduate Studies $(PostGrad)^2$	0.02	0.05	0.05	0.04

[1] Statistics weighted using PSID family weights. Tuition amounts are in 2013$.
[2] Conditional on those students who attended a 4-year college at age 18.
[3] Conditonal on those who attended a 4-year college at age 18

Comparing graduation and college quality between children who receive financial support from their parents for college and those who do not reveals further mean differences between white and black families. Children of white parents who receive parental transfers are 2 percentage points more likely to graduate from college than those who do not receive any transfers. Children of black parents who receive financial support from their parents are no more likely to graduate or enroll in post-

[7] Note that the graduation rates of both white and black children in our sample are lower than those measured by McFarland et al. (2018) for 25-29 year old adults, suggesting that a significant number of college graduates obtain their degrees in their mid or late-twenties.

graduate studies than their peers who do not receive parental support. The lack of observed mean differences between black children who receive aid for college from their parents and those who do not may be explained in part due to the fact that black parents are much less likely to provide aid for their children than white parents (only 9% of all black parents, compared to 35% of white parents), thus limiting the number of observations from which the means where calculated. Further, even among parents who did make transfers to their children for college, black parents give much less on average than white parents.

We examine how parental income and parental housing wealth affect college quality using changes in parental income and wealth in the years before a child turns 18 as instruments for income and housing wealth. These specifications mirror those on college attendance and financing decisions in Section 3.3.2 estimating regressions of the following form:

In order to identify whether racial differences exist in how parental income and parental housing wealth affect college graduation and quality, we utilize changes in parental income and wealth in the years just before a child turns 18 as instruments for income and housing wealth. We model college graduation, post-graduate enrollment, and college quality using similar specifications to those modeling college attendance and financing decisions in Section 3.3.2. We estimate regressions of the following form:

$$CollOut_{qij,18_j} = \lambda^O_{q0} + \lambda^O_{q1} Y_{imt_{18_j}}(1 - I^{HO}_{imt18_j}) + \lambda^O_{q2} Y_{imt_{18_j}} I^{HO}_{imt18_j} + \lambda^O_{q3} H_{imt_{18_j}} I^{HO}_{imt18_j} \tag{3.19}$$

$$+ \boldsymbol{\lambda}^O_{q4} \boldsymbol{X}_{ij_{18_j}} + \boldsymbol{\lambda}^O_{q5} \boldsymbol{M}_{mt_{18_j}} + \phi^O_{qt_{18_j}} + \delta^O_{qm} + \varepsilon^q_{ij,18_j},$$

for $CollOut_q = Grad$, $PostGrad$ and where $\phi^O_{qt_{18_j}}$ and δ^O_{qm} are year and the parents' MSA fixed effects, respectively. The vector, $\boldsymbol{X}_{ij_{18_j}}$, used in (3.19) is the same as the one used in equations (3.5) and (3.7) through (3.13) except that it also includes a

dummy variable for whether the child has become a head or wife in a PSID household by age 24. This extra variable controls for the source of data from which college information is obtained (PSID main interview versus Transition to Adulthood). The principal difference between the specifications in Section 3.4.1 and the college graduation and quality specifications here is that we do not include parental race in the explanatory variables for $CollOut$, instead estimating (3.19) separately for black and white families.

We address the potential endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ in (3.19) by using a 2SLS approach in addition to obtaining OLS estimates. We use the two instruments described in Section 3.3.3, $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$, that were used in the control function estimates of college choices and parental financing decisions as well as the amount of parental financial transfers made to their child.

3.4 Empirical Results

In this section we discuss our empirical results from estimating the models described in Section 3.3. We first discuss our estimates of racial differences in the effects of parental income and housing wealth on children's college enrollment and parental financing decisions, including both the likelihood that parent's make a financial transfer to help pay for their child's college, and the amount of the transfer. Next, we explore alternative approaches to calculating marginal effects from our estimated model to account for distributional differences in parental income and wealth by race. Finally, we describe our estimates of the effects of parent's net equity and income on the probability their child graduates from college, and that he or she enrolls in graduate school.

3.4.1 Children's College Attendance and Its Financing

Table 3.7 shows the results of estimating (3.5). We show estimates of the marginal effects of parental net equity ($H_{imt_{18_j}}$) and income ($Y_{imt_{18_j}}$) on children's college choices ($EduFin0$, $EduFin1$, and $EduFin2$) for both the unadjusted multinomial logit specification and for our preferred specification using the control function estimation strategy. These marginal effects are calculated separately for white parents and black parents, and by home-ownership status.[8] In our model of parent-child college and financing decisions, renters' decisions are not impacted by net equity, since we assume that net equity is zero for all renters. Table 3.9 shows the results of estimating (3.13). We present OLS and 2SLS estimates for H and Y, and estimate each model separately by race

In Panel A of Table 3.7, we present estimates of the marginal effects of white parents' net home equity when their child was age 18 ($H_{imt_{18_j}}$) and parents' annual income at that age ($Y_{imt_{18_j}}$) for the unadjusted multinomial logit specification. For renters, \$10,000 increase in income decreases the likelihood that the child does not attend college by 1.97 percentage points, increases the likelihood that they attend college but with no parental transfer by 1.35 percentage points, and increases the likelihood that they go to college and their parents provide financial help by 0.625 percentage points, with all of these effects being statistically significant at at least the 5% level. For white home-owners the effects are more pronounced. For this group, a \$10,000 increase in income decreases the likelihood that the child does not attend college by 2.45 percentage points, increases the likelihood that they attend college without parental transfers by 0.806 percentage points, and increases the likelihood that they go to college with financial support by 1.64 percentage points. A \$10,000

[8] The reported wealth ($H_{imt_{18_j}}$) and income ($Y_{imt_{18_j}}$) values for each observation were used, and all other covariates are assigned their grand sample means in the calculations. See 3.4.2 for further discussion.

increase in net equity increases the likelihood the child attends college with a transfer by 3.65 percentage points, with this effect being statistically significant at the 10% level.

In Panel B of Table 3.7, we show estimates of the marginal effects of net equity and income for black parents from the unadjusted multinomial logit specification. In contrast to the estimates for white parents, for black parents we find no significant effects of housing wealth on the likelihood of college attendance or parental financing. For renters, the effect of a $10,000 increase in income on the likelihood of not attending college and attending college without a college transfer are comparable to the estimated marginal effects for white renters (decrease of 1.56 and increase of 1.28 percentage points, respectively), while the estimated effect on the likelihood of attending college with a financial transfer is smaller (increase of 0.278 percentage points). All three estimates are statistically significant at at least the 10% level. For black home-owners, $10,000 increase in income decreases the likelihood that the child does not attend college by 1.58 percentage points and increases the likelihood that they attend college but with no parental transfer by 1.23 percentage points, with both effects being statistically significant at the 5% level.

In Panels C and D of Table 3.7 we account for the potential endogeneity of parental home equity and income on these choices. For both white parents who rent and who are home-owners, we find that a $10,000 increase in income decreases the likelihood of not attending college (2.35 and 1.87 percentage points) for the child, and increases the likelihood of attending college with a financial transfer (1.20 and 1.47 percentage points, respectively). All these estimates are statistically significant at the 5% level at least. For black parents we fail to find a similar effect of an increase in income on the likelihood the child does not go to college. For black renters, a $10,000 increase in income does increase the likelihood that the child will attend college and receive a financial transfer from their parents by 0.664 percentage

points, almost half the size of the effect for white renters. For black home-owners, the effect of an increase in income is 1.43 percentage points, comparable to the effect for white home-owners. For white home-owners we find that a $10,000 increase in net equity increases the likelihood that the child will attend college with a transfer by 1.48 percentage points, over four times the size of the effect in the unadjusted specification, and statistically significant at the 5% level. We do not find a similar effect for black home-owners, however. Instead we show that an increase in net equity of $10,000 for black families increases the likelihood that their child attends college *without* a financial transfer by 3.74 percentage points, and decreases the likelihood of not attending college by 3.11 percentage points, with the effects being statistically significant at the 1% and 5% levels, respectively.

Table 3.7: Marginal Effects of Changes in Wealth and Income on College and Financing Choices[1]

	Parents are Renters			*Parents are Home-owners*		
	EduFin0 (No Coll)	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer	EduFin0 (No Coll)	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Multinomial Logit, White Parents						
$Y_{imt_{18j}}$	-0.0197***	0.0135**	0.00625***	-0.0245***	0.00806*	0.0164***
	(0.00512)	(0.00472)	(0.00151)	(0.00251)	(0.00350)	(0.00323)
$H_{imt_{18j}}$				-0.00269	-0.000964	0.00365*
				(0.00249)	(0.00188)	(0.00177)
Panel B. Multinomial Logit, Black Parents						
$Y_{imt_{18j}}$	-0.0156**	0.0128**	0.00278*	-0.0158**	0.0123**	0.00344
	(0.00511)	(0.00488)	(0.00110)	(0.00524)	(0.00466)	(0.00263)
$H_{imt_{18j}}$				-0.00610	0.00517	0.000933
				(0.00339)	(0.00334)	(0.00185)
N	1303	1303	1303	2420	2420	2420
Panel C. Control Function w/ Bootstrapped SEs, White Parents[2]						
$Y_{imt_{18j}}$	-0.0235**	0.0114	0.0120***	-0.0187**	0.00402	0.0147**
	(0.00923)	(0.0085)	(0.0041)	(0.0089)	(0.00723)	(0.0075)
$H_{imt_{18j}}$				-0.0123	-0.00243	0.0148**
				(0.00824)	(0.00641)	(0.00677)
Panel D. Control Function w/ Bootstrapped SEs, Black Parents[2]						
$Y_{imt_{18j}}$	-0.0163	0.00964	0.00664***	-0.00456	-0.00978	0.0143***
	(0.0102)	(0.00977)	(0.00212)	(0.0109)	(0.01053)	(0.004)
$H_{imt_{18j}}$				-0.0311**	0.0374***	-0.00627
				(0.0125)	(0.0120)	(0.00573)
N	1303	1303	1303	2420	2420	2420

[1] Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and state fixed effects.

[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the control function specification and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 3.3.3 for a description of these instruments.

Since black and white families do not face equal distributions of parental income, net equity (see Table 3.4), nor similar rates of college attendance and financing (see Table 3.3), it can be difficult to directly compare our estimates between racial groups. To address this issue, and to convert our control function estimates of the effects of parental income and parental net equity into comparable terms, we compute elasticities of each of our estimates of the marginal effects of $Y_{imt_{18_j}}$ and $H_{imt_{18_j}}$ with respect to our education and financing outcomes ($EduFin$). Table 3.8 shows the elasticities of parental income and parental housing wealth by parental race. Among white homeowners, the elasticity of parental income with respect to going to college and receiving financial support is 0.383. The elasticity of parents' net housing equity for going to college with support is 0.352, only slightly below the estimate for income elasticity. For black families the gap is much larger, with the elasticities estimated at 0.715 and -0.171, respectively. Hotz et al. (2018) find larger effects of income than for equity for homeowners overall in the PSID. Our findings suggest that the extremely high marginal propensity to finance a child's college from income for black families is likely driving their results. The elasticity of income with respect to attending college with parental support is 0.36 among black renters, and 0.52 for white renters.[9]

[9] Each elasticity is evaluated at the means of the probabilities of $EduFin0$, $EduFin1$, and $EduFin2$ and the means of $Y_{imt_{18_j}}$ and $H_{imt_{18_j}}$ for the subsample of the appropriate racial group and homeownership status.

Table 3.8: Elasticity Estimates of Effects of Parents' Home Equity and Family Income on the Quality of the College their Child Attends[1]

	Parents are Renters			*Parents are Home-owners*		
	EduFin0 (No Coll)	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer	EduFin0 (No Coll)	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel C. Control Function, White Parents						
$Y_{imt_{18j}}$	-0.175**	0.218	0.520***	-0.644**	0.153	0.383**
$H_{imt_{18j}}$	x	x	x	-0.386	-0.085	0.352**
Panel D. Control Function, Black Parents						
$Y_{imt_{18j}}$	-0.091	0.147	0.360***	-0.050	-0.178	0.715***
$H_{imt_{18j}}$	x	x	x	-0.185**	0.372***	-0.171
N	1303	1303	1303	2420	2420	2420

[1] * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
All elasticities are calculated with % changes from race and homeownership-specific means of $Y_{imt_{18j}}$, $H_{imt_{18j}}$, and $EduFin_i$, $i \in 0, 1, 2$.

Table 3.9 shows the results of estimating (3.13) by race. The OLS results in columns (1) and (3) indicate that white parents who experience a $10,000 increase in income transfer more money to their children for college on average, $680 for renters and $790 for homeowners. Similarly, black parent homeowners who experience such an increase in income transfer $180 more to their children on average. White parents whose home equity increases by $10,000 transfer $290 more on average, with no corresponding difference for black parents. Once the endogeneity of income ($Y_{imt_{18_j}}$) and housing wealth ($H_{imt_{18_j}}$) are accounted for in our 2SLS specifications in columns (2) and (4), we find significant positive effects of income on financial transfers for renters and homeowners of both races. In dollar terms, the effect is 4-5 times larger in magnitude for white parents than it is for black parents, with a $10,000 increase in parental income increases transfers by $1,750 for white renters compared to only

$360 for black renters, and by $1,560 for white homeowners compared to just $400 for black homeowners.[10]

As with our estimates in Table 3.8 above, we calculate elasticities for each of our estimates of the effects of parental income with respect to transfer amounts.[11] We find that parents of both races who rent their homes are much more sensitive to changes in income when choosing how much financial assistance to provide their children for college than are homeowners. The elasticity of income with respect to financial transfers for college is 4.39 for white homeowners and 4.56 for black homeowners, compared to 1.19 and 1.84 for white and black renters, respectively. Black parents are slightly more sensitive to income changes than are white parents, conditional on homeownership status.

[10] Table B.3 in B.3 shows estimates using the same specifications, conditional on the child attending college and receiving a transfer. We again find significant positive effects of income on transfer amounts for parents of both races and homeownerships statuses, though the magnitudes of the effects are larger. The effects remain larger for white families than for black families, though the gap is smaller (less than 3 times as large).

[11] Separate elasticities are computed for renters and homeowners, as well as by the parents' race, using means of $CollTrans$ and Y for each subgroup.

Table 3.9: Effects of Changes in Wealth and Income on Amount of Parental Financing[1]

	White Parents		*Black Parents*	
	OLS	2SLS[2]	OLS	2SLS[2]
Variable	(1)	(2)	(3)	(4)
Rent$\times Y_{imt_{18j}}$	0.068*	0.175***	0.005	0.036**
	(0.036)	(0.052)	(0.005)	(0.016)
Own Home$\times Y_{imt_{18j}}$	0.079***	0.156***	0.018***	0.040***
	(0.020)	(0.046)	(0.004)	(0.011)
Own Home$\times H_{imt_{18j}}$	0.029**	0.030	-0.005	-0.006
	(0.014)	(0.032)	(0.004)	(0.013)
N	1783	1783	1837	1837

[1] Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
The sample used for these specifications includes all parent-child pairs, regardless of EduFin status. The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and MSA fixed effects.
Transfer amounts are in 10K of 2013$.
[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 3.3.3 for a description of these instruments.

3.4.2 Accounting for Distributional Differences in Parental Income and Wealth By Race

As we discuss in Section 3.4.1, estimating our multinomial logit specification of child college attendance and parental financing (3.5) using a control function strategy, we find significant differences by race in the effects of parental income and parental housing wealth. In our results, parental income decreases the likelihood of not attending college for children of white parents, regardless of their homeownership status, and increases the likelihood that they receive a financial transfer from their parents for college. For black families, parental income makes parental financial support for college more likely, but does not decrease the probability of not attending college. However, parental housing wealth does decrease the likelihood a child from a black families foregoes college, but does not increase the likelihood of parental

support. Higher housing wealth for white parents increases the likelihood of helping to pay for college for their child, but does not make it more likely their child will attend college.

While we include extensive controls for parent characteristics, family structure, location, and local labor market conditions in our model, it is possible that our analysis fails to fully account for the differences between black and white families in the distribution of parental income and parental housing wealth. When we calculate the marginal effects of income (Y) and wealth (H) shown in Table 3.7, we hold most explanatory variables at their grand sample means, but we use the observed value of income and wealth for each observation in the calculation. Since black and white families are not distributed evenly throughout the joint income and equity distribution[12], this means that our marginal effects are calculated around different points in the distribution on average, and we are not getting a true "apples-to-apples" comparison when we compare estimates between racial groups. Lovenheim and Reynolds (2013) find differing effects of changes to home equity by family income. It is likely that family income becomes increasingly important in college attendance and financing decisions for families with low net equity due to families having less housing wealth to utilize and increased difficulty for low-equity families in extracting wealth from their homes via a home equity loan.

To address these concerns and check the robustness of the results in Table 3.7, we recalculate the marginal effects of income and wealth from our control function specification, holding parental wealth and income constant across race. Table 3.10 shows the results of these calculations. Panel A and Panel B show the marginal effects of income (Y) and net equity (H) for white parents and black parents, respectively,

[12] White parents in our sample have much higher mean income and net equity than black parents (see Table 3.4)–$97,400 compared to $32,800 for net equity, and $94,900 compared to $48,000 for income. Further evidence of racial distributional differences can be found in Table B.1 and Table B.2 in B.2, which show the number of observations in each net equity and income quartile by race and weighted shared by race.

calculated at the weighted sample income and equity means of black parents. This gives an "apples-to-apples" comparison of the effects of wealth and income if black and white families had the same levels of financial resources available to them.

The results from Panel A are very similar to our findings from Panel C of Table 3.7. The principal difference is that here we find postive effect of parental income for renters on the $EduFin1$ margin as well as for $EduFin2$. A \$10,000 increase in parental income increases the likelihood of attending college without parental support by 1.26 percentage points. The estimated effects for black families are nearly identical to our findings from Panel D of Table 3.7. We again find no effect of income on the likelihood a child forgoes college, but an increased likelihood attending college with parental aid. We also still find that parental housing wealth decreases the likelihood of not attending college and increases the likelihood of attending college without financial transfers from parents.

Panels C and D of Table 3.10 show the marginal effects of income (Y) and net equity (H) for white and black parents, respectively, this time using the weighted sample means of equity and income of white parents. In the Panel C results for white parents, we now find a significant effect of net equity on the likelihood the child does not attend college, a \$10,000 increase in net equity decreasing this likeihood by 1.3 percentage points. The estimated effects for black families in Panel D show the same patterns as previous estimates.

In summary, after recalculating the marginal effects of parental income and parental housing wealth on child college attendance and parental financing decisions accounting for distributional differences between white and black families, our results remain consistent and robust. We find that parental income increases the likelihood the child attends college with financial support from their parents for everyone regardless of race and homeownership status, although the effect is larger for homeowners. We also find that parental income decreases the likelihood that

children decide to forego college white families, but not for black families. Finally, we find that parent's net equity decreases the likelihood the child skips college and increases the likelihood of attending college without financial transfers from parents. There is some sensitivity in the estimated effect of housing wealth on the chances of not attending college for white families, but these effects are smaller in magnitude than the estimates for black families and not consistently significant.

Table 3.10: Marginal Effects of Changes in Wealth and Income on College and Financing Choices, Calculating MEs at Different Values of Income and Net Equity[1]

	Parents are Renters			*Parents are Home-owners*		
	EduFin0 (No Coll)	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer	EduFin0 (No Coll)	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Control Function, White Parents, Income and Equity Means of Black Parents[2]						
$Y_{imt_{18j}}$	-0.0209***	0.0126**	0.00829***	-0.0218**	0.00876	0.0130***
	(0.0065)	(0.0060)	(0.0016)	(0.0099)	(0.0080)	(0.0050)
$H_{imt_{18j}}$				-0.0138	0.00141	0.0123***
				(0.0091)	(0.0068)	(0.0047)
Panel B. Control Function, Black Parents, Income and Equity Means of Black Parents[2]						
$Y_{imt_{18j}}$	-0.0168	0.0100	0.0068***	-0.0052	-0.0088	0.0140***
	(0.0114)	(0.0109)	(0.0023)	(0.0101)	(0.0087)	(0.0041)
$H_{imt_{18j}}$				-0.0304**	0.0358***	-0.00542
				(0.0106)	(0.0094)	(0.0044)
N	1304	1304	1304	2420	2420	2420
Panel C. Control Function, White Parents, Income and Equity Means of White Parents[3]						
$Y_{imt_{18j}}$	-0.0231***	0.0128*	0.0104***	-0.0193**	0.0028	0.0165**
	(0.0074)	(0.0066)	(0.0023)	(0.0081)	(0.0079)	(0.0074)
$H_{imt_{18j}}$				-0.0130*	-0.0037	0.0167***
				(0.0076)	(0.0057)	(0.0065)
Panel D. Control Function, Black Parents, Income and Equity Means of White Parents[3]						
$Y_{imt_{18j}}$	-0.0190	0.0098	0.0092**	-0.0038	-0.0133	0.0171***
	(0.0125)	(0.0115)	(0.0038)	(0.0090)	(0.0087)	(0.0066)
$H_{imt_{18j}}$				-0.0282***	0.0381***	-0.00104**
				(0.0078)	(0.0085)	(0.0038)
N	1304	1304	1304	2420	2420	2420

[1] Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and state fixed effects.

The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 3.3.3 for a description of these instruments.

Marginal effects are calculated separately for renters and homeowners, holding all covariate values at the sample mean for all parents with the appropriate home-ownership status, except for Income ($Y_{imt_{18j}}$) and Net Equity ($H_{imt_{18j}}$).

[2] For these specifications, marginal effects are calculated as above, and at the weighted income and net equity means of all black parents with the appropriate home-ownership status in our sample.

[3] For these specifications, marginal effects are calculated as above, and at the weighted income and net equity means of all white parents with the appropriate home-ownership status in our sample.

3.4.3 Children's College Attainment

In Table 3.11, we present the OLS and 2SLS estimates of the effects of parental income ($Y_{imt_{18_j}}$) for renters and parental housing equity ($H_{imt_{18_j}}$) for both renters and homeowners on college graduation ($Grad_{ij,18_j}$) and subsequent post-graduate enrollment ($PostGrad_{ij,18_j}$) for their child. As noted above, we provide separate estimates by parental race. Our OLS estimates in Panel A show no significant relationship between parental income and wealth and college graduation. The mean differences observed between children who attend college with financial support and those who attend college without parental aid are no longer evident once family characteristics such as parental age, family structure, education, and location are controlled for.

Our 2SLS estimates indicate that, once the endogeneity of parental income and housing wealth are controlled for, housing wealth increases the likelihood of graduation for children of white parents by 1.6 percentage points for a $10,000 increase in net equity. We find no significant evidence of similar effects of wealth for black families. Instead, our estimates indicate that parental income increases the likelihood of graduation for children of black parents both for families who are renters and those who own homes. The effect of a $10,000 increase in parental income is 5.3 percentage points for black renters, more than twice the magnitude as the effect for homeowners, 2.5 percentage points. Our 2SLS estimates for *PostGrad* in Panel B only show significant effects on post-graduate enrollment for children of black homeowners, where a $10,000 increase in home equity increases the likelihood of enrollment by 1.1 percentage points. Expressing these estimates as elasticities as in Section 3.4.1, we find that the elasticity of college graduation with respect to parental income is 1.18 for children of black renters and 0.60 for children of black homeowners, compared to just 0.10 and 0.004 for children of white renters and homeowners, respectively. The

elasticity of graduation with respect to parental housing wealth is 0.45 for children of white parents, compared to 0.16 for children with black parents.

Here we again find differences by race in the effect of parental resources on graduation. It is interesting to note that these results, combined with our findings from Table 3.7 in Section 3.4.1 indicate that for black families, parental wealth increases college enrollment but not the likelihood of graduation, while parental income does have a positive effect on graduation, but does not make enrollment any more likely. A possible explanation for these patterns is that, although increases to housing wealth for black parents may provide sufficient additional resources and financial security to induce their child to enroll in college[13], the difficulty for black families in extracting equity via home equity loans makes them unable to continue support for their children throughout their college experience, making graduation more difficult. We see this in the results in Section 3.4.1, where we find that housing wealth does not make black parents any more likely to give their children financial transfers for school. Black parents who experience increases in income (for which liquidity is not a concern the way it is for housing wealth) are both more likely to give money to their children for college and make larger transfers than those who do not. Parental financial assistance could be an important determinant in whether a child has support throughout all their years in college and are able to graduate.

In additional specifications discussed in B.4 we estimate the effect of parental income and wealth on measures of college quality. We find small negative effects of income on annual tuition for black renters, and on the likelihood of attending a 4-year or private college for white renters.

[13] One possible reason for this is that increases to net housing equity from appreciation to the parents' main residence are explicitly excluded from the calculated Expected Family Contribution (EFC) used to determine a child's eligibility for Pell grants and other forms of student financial assistance. The presence of additional family financial resources without decreasing student financial aid possibilities could explain why housing wealth increases enrollment, whereas increases to parental income – which *would* be included in EFC calculations and reduce expected grant awards – would not.

In summary, our results from this section suggest that there are significant racial differences in the effect of parental housing wealth and parental income on their child's likelihood of graduation. Housing wealth is an important determinant of graduation for white children, whereas income matters more for whether black children graduate from college, and increases the likelihood of enrollment in graduate school for black renter families. Furthermore, the effect of income on the likelihood of graduation for black families is quite large in magnitude.

Table 3.11: Effects of Parents' Home Equity and Family Income on Probability of Child Graduating from College and Enrolling in Graduate School[1]

	White Parents		*Black Parents*	
	OLS	2SLS[2]	OLS	2SLS[2]
Variable	(1)	(2)	(3)	(4)
Panel A. Graduate from College[3]				
Rent$\times Y_{imt_{18j}}$	-0.002	0.005	0.007	0.053***
	(0.005)	(0.007)	(0.008)	(0.019)
Own Home$\times Y_{imt_{18j}}$	0.001	-0.007	0.007	0.025**
	(0.002)	(0.006)	(0.005)	(0.011)
Own Home$\times H_{imt_{18j}}$	0.000	0.016*	-0.002	0.012
	(0.001)	(0.009)	(0.003)	(0.009)
N	1134	1134	665	665
Panel B. Enroll in Graduate School[3]				
Rent$\times Y_{imt_{18j}}$	-0.001	0.005	0.003	0.012
	(0.005)	(0.008)	(0.004)	(0.012)
Own Home$\times Y_{imt_{18j}}$	-0.0001	-0.003	0.004	0.011**
	(0.0013)	(0.003)	(0.003)	(0.006)
Own Home$\times H_{imt_{18j}}$	0.0004	0.006	0.00003	-0.004
	(0.0005)	(0.0039)	(0.0022)	(0.0041)
N	1134	1134	665	665

[1] Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and MSA fixed effects.
[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the control function specification and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 3.3.3 for a description of these instruments.
[3] Conditional on those students who attended college at age 18.
[4] Conditional on those students who attended a 4-year college at age 18.

3.5 Conclusion

This paper builds upon the literature identifying the important role that parental financial resources play in whether their child enrolls in college, the type and quality of college attended, and whether their child graduates from college. Given the documented gaps between black and white families in wealth and income, as well as

disparities between black and white students in post-secondary educational outcomes including, enrollment, college quality, graduation, and student debt, we explore the link between parental resources and financing of college for their children and these racial differences.

We use data from the PSID and leverage information from the 2013 Rosters and Transfers Module that details the incidence and amounts of financial transfers from parents to children for college. We construct instruments for the endogeneity of parents' income and net housing equity with college enrollment and financing choices and graduation using measures of changes to local labor market and housing market conditions. We use these instruments to estimate the effects of parents' net home equity and income on these educational outcomes. We obtain separate estimates for black and white families for comparison.

We find evidence of significant racial differences in the effects of parental income and housing wealth. We find that increases in parental income increase the likelihood that parents make financial transfer to their child to help pay for college for both black and white families. For white families, increases in parental income also increase the likelihood that their child enrolls in college, but does not for black families. Our results indicate that increases to parental housing wealth for black parents make it more likely that their child attends college, but does not increase the probability that the parents help pay for their child's college. Increases to white parent's wealth do not affect the likelihood that their child enrolls in college, but do raise the likelihood that the parents will offer financial support to their child. The effects of parental income and parental wealth on whether parents offer financial assistance for their child's college are similar in size for white parents, while the effect of income is much larger than the effect of wealth for black families. These findings are robust to alternative estimates accounting for differences in the joint distribution of income and wealth between white and black families. We further find that increases to parent's income

increases the amount of financial support offered to children, and the impact is much larger for white parents than for black parents.

The racial differences are evident in graduation from college as well. We find that increases to parent's housing wealth increases the probability of graduation for children of white parents but not for children of black parents, but increases to parental income increase the likelihood of graduation for black children but not white. The effects of parental income on graduation for black children are larger than the effects of parental wealth on graduation for white children. We also find evidence that increases to parent's income reduce the average annual tuition of the college attended by black children and the likelihood of attending a 4-year or private college for white children, but only for renters.

These findings are important because they establish the existence of racial differences in patterns of parental support for college. Prior research has identified that parental income and wealth affect college attendance and graduation, and that financial transfers from parents to child is a key mechanism through which this relationship works. Our results suggest that there are fundamental differences in the way this mechanism operates for housing wealth between black and white families. Even though black parents who experience increased housing wealth do not give their children more support for college, their children are still more likely to enroll. That black parents seem unable or unwilling to take advantage of their housing wealth to support their children's college education may play an important role in the documented racial gaps in educational outcomes, leading to the observed lower graduation rates and higher student loan debt[14] for black college students. It is the case that black parents are much less likely to own a home, and have lower home equity conditional on being a homeowner, but even comparing "apples to apples",

[14] In future work we will explore the role of college attendance and parental financing decisions on subsequent indebtedness for racial differences. A preliminary table of mean differences in indebtedness can be found in B.5.

black parents are less likely to take advantage of increases in wealth to pay for their child's college than white parents with similar resources.

Exploring these patterns further is an important topic for future research. There is some evidence that black families may be more constrained in their ability to obtain home equity loans than comparable white families. Testing the extent to which such constraints explain the differing responses to increases of housing wealth of black and white parents would be a valuable contribution to our understanding of the link between racial gaps in wealth and educational attainment.[15] Increases in parents' housing wealth do not impact their child's eligibility for needs-based financial aid in the form of pell grants, etc. the same way a similar increase in income or non-housing wealth would. This attribute of financial aid policy may reduce the effect of wealth on a parent's likelihood to offer financial support to their child for college relative to effect of income. Exploring the role of financial aid in the child's college attendance and parent's college financing decision could also be a fruitful avenue for future work.[16] Finally, understanding the relative contributions to the black-white gap in enrollment, graduation, and subsequent debt of initial racial gaps in wealth and income versus the liquidity constraints faced by black parents in extracting wealth from their homes to contribute to their child's college education could offer insight into areas of focus for public policy to address racial inequality in education.

[15] In future work we will introduce specifications that include whether or not parent's have obtained a home equity loan in addition to their primary mortgage to explore the importance of liquidity constraints in extracting home equity. We also will explore using information collected in accordance with the Home Mortgage Disclosure Act (HMDA) to construct measures of mortgage application rejection rates by race for different geographic locations. We intend to use these measures as an instrument for the ability to borrow against one's home.

[16] In future work we intend to construct measures of eligibility for financial aid for each child in our sample to include in our model of college attendance and parental financing decisions.

4

Conclusion

This dissertation builds upon the literature documenting the important role that parental resources play in the choices families make with respect to the college education of children, as well as the consequences of those choices, in terms of educational outcomes and subsequent indebtedness. Chapter 2 examines the influence of parental income and housing wealth on college attendance and parental financial support for college, and on college graduation rates and quality of college attended. This is done using data from the PSID, especially the 2013 Rosters and Transfers Module that includes information on the incidence and amounts of transfers from parents to their adult children for college. The analysis includes the construction of instruments to address the potential endogeneity of parental income and housing wealth, based on changes in the housing and labor markets local to parents' households in the period leading up to their child's 18th birthday. These instruments were used to obtain causal estimates of the effects of parental income and wealth on educational outcomes. The results establish parental transfers to children as the mechanism by which increases to parent's income and wealth increase the likelihood their children enroll in college. They further contribute to the literature by comparing the effects

of income and wealth, and demonstrate that the size of this effect is larger for income than for housing wealth. In addition, the findings show that parental wealth increases graduation rates. Finally, suggestive evidence with respect to indebtedness of parents and children after college indicates that parental transfers to children for college increase the debt of parents but do not decrease the levels of student debt for children.

Chapter 3 takes the methods described in the previous chapter and applies them to a new set of questions, exploring the link between parental resources and the financing of children's college and documented racial gaps in college outcomes, as well as disparities in wealth and income between black and white families. I find evidence of significant racial differences in the effects of parental income and housing wealth. Importantly, I find that while increases in both the income and housing wealth of white parents increase the likelihood they offer financial support to their children for school, only changes to income have an effect on the likelihood of transfers for black parents. Even though increases to parental wealth raise the likelihood that black children enroll in college, this effect appears to operate by some mechanism other than inter-vivos transfers. Accordingly, parental income has a much stronger effect on educational outcomes for black families than white. The size of the effect of changes to parental income on the likelihood of transfers is approximately twice as large for black parents than white ones. In similar fashion, increases to parent's income have a very large positive effect on the likelihood of graduation for children of black parents, with no significant effect of income on graduation for white children. Instead, there is a small but significant effect of changes to income on the probability of graduation for white families. In connection with these findings, I propose avenues for future research, to further explore the importance of racial differences credit constraints in obtaining home equity loans in black-white differences in the

post-secondary educational outcomes, including college enrollment and financing decisions.

Taken together, both chapters of this dissertation establish the importance of parental transfers as a mechanism by which the resources of parents contribute to the educational outcomes of their children, and provide fertile ground for future work.

Appendix A

Chapter 2 Appendix

A.1 Descriptive Statistics for Demographic Characteristics of Parents and their Children

Table A.1: Characteristics of Homeowning Parents & College-Age Children in PSID, 1997-2015[1]

Variable	Mean
Parent Characteristics when Child was Age 18:	
Parent married/cohabiting	0.70
Parent HH Headed by Male	0.82
Number of children under 16 in parent HH	0.87
Age of parent House Head	45.58
Parents Non-White	0.29
Parent's Education:	
High school or less	0.21
Some College	0.51
College graduate	0.28
Child Characteristics:	
Sex of child (male=1)	0.48
Year child turned 18[2]	2004.50

[1] Statistics weighted using PSID family weights.
[2] The range of years in which children turned age 18 is 1998–2015.

A.2 F-Tests for Weak Instruments in First-Stage Regressions for Control Function and IV Estimators

Below we provide statistics for F-tests of the joint significance of the instrumental variables in the first-stage regressions for the control function and 2SLS estimators used in the various analyses presented in the paper. In the Table below, we indicate the tables to which the test statistics of the first-stage regressions correspond and the instrumental variables used in these regressions. We note that F-test statistics with values less than 10 for first-stage regressions are considered evidence of weak instruments (Stock and Staiger, 1997).

Table A.2: F-Tests of Joint Significance of Instruments in First Stage Regressions[1]

Dependent Variable:	$Y_{imt_{18,j}}$	$H_{imt_{18,j}}$	$Y_{imt_{18,j}}$	$H_{imt_{18,j}}$
First Stage Regressions for Results in Table 3.7:				
	Coll. Choice & Financing		*Amt. Transferred*	
F-test	20.34	73.53	17.16	64.05
R^2	0.361	0.524	0.459	0.573
First Stage Regressions for Results in Table **??**:				
	Graduate from College[2]			
F-test	61.30	35.02		
R^2	0.558	0.573		
	Annual Tuition Costs[2]		*Attended 4-Year College*[2]	
F-test	44.24	11.89	43.80	12.04
R^2	0.611	0.636	0.610	0.637
	Attended Private College[3]		*College Quality Index*[3]	
F-test	27.95	12.83	28.28	12.65
R^2	0.624	0.635	0.623	0.635

[1] The instruments used in all of these regressions and for which the F-tests apply are: $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$.

[2] These regressions are for children who attended college at age 18.

[3] These regressions are for children who attended a 4-year college at age 18.

Table A.3: F-Tests of Joint Significance of Instruments in First Stage Regressions

Dependent Variable:	$Y_{nmt_{24}}$[1]
First Stage Regressions for Results in Panel A of Table **??**:[2]	
Parents' Mortgage Debt at t_{24_j}	
F-test	22.36
R^2	0.789
Parents' Other Debt at t_{24_j}	
F-test	22.18
R^2	0.789
First Stage Regressions for Results in Panel B of Table **??**:[3]	
Child's Student Loan Debt at t_{24_j}	
F-test	124.60
R^2	0.849
Child's Other Debt at t_{24_j}	
F-test	181.30
R^2	0.811

[1] The n subscript for $Y_{nmt_{24}} = i$ for parents and $= j$ for child.
[2] The instruments used in the parents' debt regressions and for which the F-tests apply are: $\Delta HPI_{mt_{18_j}}$, $\Delta W^P_{mt_{18_j}}$, $\Delta W^P_{mt_{24_j}}$ and $Dist4YrPub_{ijm}$.
[3] The instruments used in the child's debt regressions and for which the F-tests apply are: $\Delta HPI_{mt_{18_j}}$, $\Delta W^P_{mt_{18_j}}$, $\Delta W^C_{mt_{24_j}}$ and $Dist4YrPub_{ijm}$.

A.3 Parents' Home Equity Loans when Child Age 18 and their Impact on College Graduation

In this Appendix, we present an alternative version of the results for whether a parents' child graduated from college in Panel A of in Table **??** in which we include an indicator variable for whether the parents had a home equity loan when their child wage age 18 to the OLS and 2SLS regressions. (This indicator variable, $HEquityLoan_{imt_{18_j}}$, is equal to 1 if the parent had a home equity loan when child j was age 18 and equal to 0 otherwise.) The results are displayed in Table A.4.

Table A.4: Effects of Parents' Home Equity, Family Income, and Whether Parent had Home Equity Loan when Child was Age 18 on Whether Child Graduated from College, for College Attendees[1]

	OLS	2SLS[2]
Variable	(1)	(2)
$H_{imt_{18_j}}$	0.0007	0.0153**
	(0.0021)	(0.0076)
$Y_{imt_{18_j}}$	0.0043*	-0.0032
	(0.0021)	(0.0085)
$HEquityLoan_{imt_{18_j}}$	0.0627	1.3499*
	(0.0405)	(0.8533)
R^2	0.292	
N	1,322	1,322

[1] Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, whether the child is a head or wife at age 24, the high school and college wage premium, year fixed effects, and county fixed effects.
[2] The variables $H_{imt_{18_j}}$, $Y_{imt_{18_j}}$ and $HEquityLoan_{imt_{18_j}}$ were treated as endogenous in the 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$, $\Delta W^P_{mt_{18_j}}$, $\Delta HPI_{mt_{18_j}} \times \Delta W^P_{mt_{18_j}}$, $(\Delta HPI_{mt_{18_j}})^2$, and $(\Delta W^P_{mt_{18_j}})^2$.

Appendix B

Chapter 3 Appendix

B.1 PSID Oversampling of Black Families

The main sample used in our analysis of child college attendance and parental financing decisions made by families in the PSID consists of 3,724 parent-child pairs, 1,841 with non-hispanic white parents and 1,883 with non-hispanic black parents. The number of black families at first glance may seem very large relative to the number of white families, since the percentage of the US population who are black was much lower than the percentage that were white during our study period of 1998-2013, 12.3% black in 2000, 12.6% black in 2010 (Grieco and Cassidy (2001), Humes et al. (2011)). However, the high number of black families in our sample can be explained in large part due to (1) the sampling design of the original 1968 PSID survey; (2) choices made by the PSID in 1997 when the sample was reduced; (3) differential divorce rates by race; and (4) differential fertility by race.

B.1.1 Original Survey Design

The Panel Study of Income Dynamics was launched in 1968. As a continuation of the Survey of Economic Opportunity (SEO) study started by the U.S. Bureau of the Census at the direction of the Office of Economic Opportunity to evaluate the success of the War on Poverty, it consisted of two components. First, a subsample of the 1966 and 1967 SEO sample, which oversampled census districts with large non-white populations. Second, a nationally representative sample from the national sampling frame used by the Survey Research Center (SRC) at the University of Michigan was also included. In its first year, the full 1968 PSID sample had 1,872 low income households from the SEO and 2,930 households from the SRC sample, which were nationally representative. As the low-income households from the SEO were more likely to include black respondents than the overall population, the PSID began with a higher number of black households than a truly nationally representative sample would be. These original 1968 PSID respondents passed on the "PSID gene" to their children, and on to subsequent generations, who make up the sample we use in our analyses.[1] This sample includes descendants of 1968 PSID respondents from both the SEO and SRC portions, so we would expect a higher proportion of black families from which to draw parent-child pairs for our analyses than would be found in the general national population.

B.1.2 1997 Sample Changes

By 1997 the number of households in the core PSID sample had grown to create a larger sample than it was feasible to continue to follow given the funding available. As a result, starting with the 1997 wave the PSID made several changes in order to

[1] More information about the design and history of the PSID can be found in McGonagle and Freedman (2012)

reduce costs. One of these changes was a significant reduction in the PSID "core" sample, which was decreased in size by approximately one third. A portion of the SEO sample was dropped, including all non-black SEO sample members. Only black family trees were retained from the SEO sample, further increasing the number of black households relative to white (Heeringa and Connor (1999)).

In addition, there were 600 black PSID families with children under age 13 who were initially identified to be dropped from the study that were retained (or "reinstated") in order to participate in the new Child Development Supplement (CDS) to the PSID that was introduced in 1997 (Freedman and Schoeni (2016)). Not only did this further increase the number of black families in the PSID, it increased the number of black *parents* in particular. Since the sample we use in our analyses includes only households with children that turn 18 between 1998 and 2013, this choice to "reinstate" black parents led to a larger number of black parent-child pairs being available for us to use.

As a result of these choices, in 1997 30.6% of all PSID households had a black head, compared to only 12% of all households in the 1997 CPS. 33.5% of all individuals in 1997 PSID were black, compared to 12.8% of all individuals in 1997 CPS.

B.1.3 Differential Divorce Rates and Fertility by Race

In the sample we use for our analyses in this paper, it is possible for children to appear more than once. If a child's parents are divorced and both parents are PSID respondents, then two distinct parent-child pairs could be formed, one to each parent, and the child would appear twice. If divorce rates differ by race and black parents are more likely to separate than white parents, this could lead to more children of

black parents to be "double counted" in this way, increasing the number of black parents further relative to white parents.

It appears to be the case that black parents in our sample are more likely to be separated than white parents. In our sample, 60% of all black parent households are headed by a single parent, compared to only 21% of white parent households (see Table 3.2). Furthermore, it is the case that only 4.6% (85) of children of white parents appear twice in our sample, compared to 7.3% (137) of children of black parents.

Finally, it is also possible for *parents* to be "double counted" in our sample if they have more than one child reach the age of 18 during our sample period of 1998 to 2013. If black parents are more likely to be "double counted" in this way, this would further increase the number of black families relative to white families. There is evidence of just such a racial gap in fertility in our sample. Black parent households in our sample have on average 2.0 children under 16 in their households, compared to 1.93 children on average for white parent households (see Table 3.2). 936 (51%) of white parents in our sample have at least one additional child under 16 in their household, compared to 1,149 (61%) of black parents.

B.2 Number of Black and White Parents by Net Equity and Income Quartiles

Table B.1: Number of Observations in Housing Wealth and Income Quartiles by Race[1]

	Income Quintile				
Net Equity Quartile	1st	2nd	3rd	4th	Total
White Parents					
1st	160	129	79	42	410
2nd	68	133	92	40	333
3rd	35	110	227	150	522
4th	26	79	142	329	576
Total	289	451	540	561	1841
Black Parents					
1st	626	276	101	26	1029
2nd	144	155	99	16	414
3rd	65	129	79	49	322
4th	16	28	35	38	117
Total	851	588	314	129	1882

[1] The sample uses for this table corresponds exactly to the sample used to produce Table 3.5. Income and net equity quartile cutpoints were determined from the full sample of white and black parents pooled together.

Table B.2: Shares of Parents in Housing Wealth and Income Quartiles by Race[1]

	Income Quintile					
Net Equity Quartile	1st	2nd	3rd	4th	Total	Quantile Max
White Parents						
1st	10.33%	6.80%	3.89%	2.04%	23.05%	$0
2nd	4.20%	6.85%	4.49%	2.17%	17.71%	$27.4k
3rd	2.35%	5.92%	11.77%	8.01%	28.06%	$79.2k
4th	1.51%	4.05%	7.21%	18.40%	31.18%	$2,062k
Total	18.39%	23.63%	27.36%	30.62%	100.00%	
Black Parents						
1st	34.12%	16.17%	7.65%	1.89%	59.82%	$0
2nd	8.83%	6.52%	4.34%	0.76%	20.44%	$27.4k
3rd	2.49%	6.21%	3.95%	2.33%	14.98%	$79.2k
4th	1.15%	1.38%	0.74%	1.49%	4.76%	$2,062k
Total	46.58%	30.29%	16.67%	6.46%	100.00%	
Quantile Max	$37.4k	$68k	$107.1k	$1,021k		

[1] The sample uses for this table corresponds exactly to the sample used to produce Table 3.5. Income and net equity quartile cutpoints were determined from the full sample of white and black parents pooled together.
Weighted percentages calculated using PSID family weights.

B.3 Additional Analysis of the Effects of Changes in Wealth and Income on the Amount of Parental Financing for Child's College

Table B.3: Effects of Changes in Wealth and Income on Amount of Parental Financing, Conditional on Attending College with Parental Financial Assistance[1]

	White Parents		*Black Parents*	
	OLS	2SLS[2]	OLS	2SLS[2]
Variable	(1)	(2)	(3)	(4)
Rent$\times Y_{imt_{18j}}$	0.087	0.238**	0.040	0.172*
	(0.090)	(0.110)	(0.039)	(0.088)
Own Home$\times Y_{imt_{18j}}$	0.109***	0.265***	0.077***	0.095**
	(0.030)	(0.088)	(0.020)	(0.038)
Own Home$\times H_{imt_{18j}}$	0.030	0.001	-0.055*	0.027
	(0.028)	(0.047)	(0.027)	(0.049)
N	644	644	191	191

[1] Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and MSA fixed effects.
Transfer amounts are in 10K of 2013$.
[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the control function specification and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 3.3.3 for a description of these instruments.

B.4 Racial Differences in The Role of Parental Income and Wealth on Additional College Outcomes

B.4.1 Data and Measures

To examine the consequences of college attendance and financing decisions on educational and financial outcomes, we examine the parent-child pairs in our main sample in the year in which the child turns 24. This limits the sample to parent-child pairs in which the child turned 18 prior to 2009.[2] For the outcome of parental debt, this restriction yields a sample size of 3,352 (1,674 white parent households and 1,678 black) for housing debt and 3,331 (1,665 white and 1,666 black) for non-housing debt that includes credit card debt, and auto loan debt. For the outcome of college completion, we further limit the sample to children who attended college which yields a sample size of 1,418 parent-child pairs.

Measures of college quality and child indebtedness are only available for two subsamples of children: (a) those who are a PSID head or wife by age 24 or (b) those who are members of their parents' household at age 24 but are interviewed as part of the Transition to Adulthood (TA) study. The TA study has followed children in the PSID's Child Development Study (CDS) as they become adults. The TA study includes questions about which college children attended as well as information on income and debt. Using these two sources of data, we construct a total sample of 2,229 adult children with which to analyze their non-housing debt at age 24 (1,250 with white parents and 1,049 with black parents) and 1,678 with which to analyze student loan debt at that age (864 with white parents and 814 with black parents). We have a smaller sample of children to analyze student debt at age 24 because the PSID only started asking about this source of debt separately in 2011. For

[2] If the relevant data are not available for the child or parent in the year in which the child is age 24 we go back one year at a time until the child is age 22 and forward one year at a time until the child is 27.

the outcomes of college cost and quality, we further limit the sample to children who attended college and whose college can be linked to the data from the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) database which yields a sample size of 846 (634 white and 212 black) for tuition and 844 (633 white and 211 black) for four-year degree status. Public/private status of the college and our measure of college quality which we construct from the IPEDS data are only available for children who attend a four-year college which limits our sample to 682 (517 white and 165 black) for public/private college status, and 675 (512 white and 163 black) for college quality.

College Cost and Quality: We link responses from the main PSID interview or the TA study on the college attended to measures of college cost and quality available from the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) database. We obtain the annual tuition costs for a full-time student at that institution in the year they would have started college. In doing so we use the state of residence of the parent at that time to determine whether children would have paid in-state or out-of-state tuition at any public institutions.[3] For college quality we use three separate measures. First, we measure whether the institution grants 4-year degrees. Second, we use whether a child attended a private university, where we restrict our attention to students who attend a 4-year university. Finally, we use the college quality index used in Black and Smith (2004), Black et al. (2005), Black and Smith (2006), Dillon and Smith (2017b), and Dillon and Smith (2017a).[4] The index is based on the following measures of colleges' selectivity and resources: college's mean SAT or ACT scores; percent of applications rejected; average salary of faculty involved in instruction; and the undergraduate faculty-

[3] We use in-state tuition if the parents resided in the same state as the institution in the year the child turned 18, and out-of-state tuition otherwise.

[4] We thank Nora Dillon and Jeff Smith for providing us with the latest version of these quality indices for 4-year and 2-year colleges in the U.S.

student ratio.[5] The index is the first principal component of these four indicators of college quality measured in 2008.[6]

We obtain the annual tuition costs for a full-time student at that institution in the year they would have started college, which we denote by the variable $Tuition_{ij,18_j}$. We measure whether the institution was a 4-year college or university, denoted by the variable $4YrColl_{ij,18_j}$, and whether it was a private institution, denoted by the dummy variable $Private_{ij,18_j}$. We denote the quality index described above by $Quality_{ij,18_j}$.

Table 3.6 shows the mean values for each of the measures described above for the children in our family. Means are shown separately by race of each child's parents, for all college attendees, for children who attend college without parental support ($EduFin1$), and for children who attend college and receive a financial transfer from their parents ($EduFin2$). Children from white families are more likely to attend a 4-year institution, and attend a private institution than children from black families. They also attend more expensive ($10,166 per year versus $7,324) and higher quality colleges on average.

B.4.2 Empirical Results

We estimate (3.19) as described in Section 3.3.4, substituting $CollOut_q = Tuition$, $4YrColl$, $Private$, and $Quality$.

In Table B.6, we present OLS and 2SLS estimates of the effects of parental net equity and parental income on different measures of quality for the colleges each child attended, in the year the child turned 18. In Panel C we show the effects on annual tuition costs ($Tuition$). Our results indicate that for black parents who rent their homes, income has significant negative effect on the average tuition of the college

[5] These dimensions of quality for colleges in the U.S. are obtained from the Integrated Post-Secondary Education Data System (IPEDS) and college rankings by *U.S. News & World Report*.

[6] The particular version of college quality index we use takes on values from -9 to $+9$ and is constructed to have a mean of 0 across all of 4-year colleges and universities in the U.S.

their child atttends. A $10,000 increase in income decreases the mean tuition of their child's college by $1,724.8 on average, a sizable change from the overall mean tuition of $7,324 for all black college students in our sample. We find no significant effects of income or wealth on tuition for black homeowners, nor do we find any effects of income or wealth on any of the other college quality measures for black families.

We do not find any significant effect of income on tuition for white families. Our results do show that children of white parents who experience an increase in net equity do attend slightly more expensive schools on average (only $117.7 higher than the mean of $10,166), but this disappears when the endogeneity of net equity is accounted for in the 2SLS specification. Panel D and Panel E suggest that for white families who rent their homes, a $10,000 increase in parental income decreases the likelihood their child attends a 4-year college and they attend a private college, by 2.6 and 2.9 percentage points, respectively. A similar increase in housing wealth for white parents decreases the likelihood of their child attending a 4-year college by 1.2 percentage points.

Table B.4: Annual Tuition, Types of College, and College Quality[1]

	Attended College	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer
White Parents			
Annual Tuition $(Tuition)^2$	$10166	$8290	$11461
Attended 4-year College $(4YrColl)^2$	0.81	0.75	0.85
Attended Private College $(Private)^3$	0.41	0.39	0.43
College Quality Index $(Quality)^3$	0.31	-0.02	0.50
Black Parents			
Annual Tuition $(Tuition)^2$	$7324	$7047	$8019
Attended 4-year College $(4YrColl)^2$	0.67	0.67	0.66
Attended Private College $(Private)^3$	0.36	0.36	0.36
College Quality Index $(Quality)^3$	-0.21	-0.23	-0.15

[1] Statistics weighted using PSID family weights. Tuition amounts are in 2013$.
[2] Conditional on those students who attended a 4-year college at age 18.
[3] Conditonal on those who attended a 4-year college at age 18

Table B.5: Effects of Parents' Home Equity and Family Income on the Type of College their Child Attends[1]

	White Parents		*Black Parents*	
	OLS	2SLS[2]	OLS	2SLS[2]
Variable	(1)	(2)	(3)	(4)
Panel C. Annual Tuition Costs[3]				
Rent$\times Y_{imt_{18j}}$	-273.7	-207.8	-1216.6**	-1724.8**
	(236.4)	(381.2)	(485.0)	(719.0)
Own Home$\times Y_{imt_{18j}}$	6.4	117.6	-474.6	-510.8
	(54.4)	(171.8)	(296.2)	(449.9)
Own Home$\times H_{imt_{18j}}$	117.7**	-75.07	-283.6	-649.6
	(50.8)	(228.4)	(256.1)	(513.0)
N	693	693	238	238
Panel D. Attended 4-Year College[3]				
Rent$\times Y_{imt_{18j}}$	-0.016***	-0.026***	-0.025	-0.078
	(0.006)	(0.009)	(0.031)	(0.052)
Own Home$\times Y_{imt_{18j}}$	-0.001	0.003	-0.010	-0.023
	(0.002)	(0.005)	(0.012)	(0.025)
Own Home$\times H_{imt_{18j}}$	0.002	-0.012*	0.014	0.012
	(0.002)	(0.007)	(0.011)	(0.015)
N	692	692	237	237

[1] Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and MSA fixed effects.
[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the control function specification and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 3.3.3 for a description of these instruments.
[3] Conditional on those students who attended college at age 18.
[4] Conditional on those students who attended a 4-year college at age 18.

Table B.6: Effects of Parents' Home Equity and Family Income on the Average Tuition and Quality of the College their Child Attends[1]

	White Parents		*Black Parents*	
	OLS	2SLS[2]	OLS	2SLS[2]
Variable	(1)	(2)	(3)	(4)
Panel E. Attended Private College[4]				
Rent×$Y_{imt_{18j}}$	-0.016	-0.029**	-0.048	-0.045
	(0.014)	(0.014)	(0.039)	(0.038)
Own Home×$Y_{imt_{18j}}$	-0.001	-0.003	-0.007	0.005
	(0.003)	(0.009)	(0.024)	(0.042)
Own Home×$H_{imt_{18j}}$	0.003	-0.008	-0.024	-0.073
	(0.003)	(0.013)	(0.018)	(0.062)
N	555	555	179	179
Panel F. College Quality Index[4]				
Rent×$Y_{imt_{18j}}$	0.034	0.033	0.021	0.019
	(0.022)	(0.031)	(0.071)	(0.073)
Own Home×$Y_{imt_{18j}}$	0.024**	0.019	0.003	-0.041
	(0.010)	(0.030)	(0.043)	(0.116)
Own Home×$H_{imt_{18j}}$	0.017*	0.002	0.010	0.094
	(0.009)	(0.029)	(0.033)	(0.166)
N	550	550	177	177

[1] Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and MSA fixed effects.

[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the control function specification and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 3.3.3 for a description of these instruments.

[3] Conditional on those students who attended college at age 18.

[4] Conditional on those students who attended a 4-year college at age 18.

B.5 Parent and Child Debt, Post-College

B.5.1 Measures

Parental and Child Indebtedness: We consider several forms of indebtedness for both parents and their children. For parents, we consider mortgage debt, the sum of all their primary and secondary mortgages along with home equity loans, and all other non-housing debt, including outstanding credit card and medical debt, as well as other outstanding loans. These measures are obtained in the PSID wealth module which has been included in every survey since 1997. For children, we examine debt in the form of outstanding student loans, as well as total other non-housing debt. Student loan debt is obtained from the TA survey and from the PSID wealth module after 2011. Total non-housing debt is measured in the TA survey and in the PSID wealth module.

Table B.7: Parents' and Child's Debt when Child Age 24, by College Attendance and Financing Decisions[1]

Variable	Full Sample	EduFin0 (No Coll)	EduFin1 (Coll, but No Transfer	EduFin2 (Coll & Transfer
Parents' Debt				
White Parents				
Mortgage Debt	$6.62	$3.62	$5.93	$10.03
Other Debt	$1.39	$0.88	$1.42	$1.85
Black Parents				
Mortgage Debt	$2.46	$1.78	$2.99	$5.20
Other Debt	$0.70	$0.42	$1.16	$1.05
Child's Debt				
White Parents				
Other Debt	$1.21	$0.78	$1.62	$1.28
Student Debt	$1.12	$0.18	$1.70	$1.56
Black Parents				
Other Debt	$0.53	$0.27	$0.95	$0.95
Student Debt	$0.53	$0.20	$1.04	$1.29

[1] Statistics weighted using PSID family weights. All debt amounts are in 10K of 2013$.

Bibliography

Andreski, P., Kreisman, D., and Schoeni, R. F. (2015). Comparing estimates of student loans measured in the psid-tas with the national postsecondary student aid survey. Technical Report Technical Series Paper #15-02, PSID.

Arcidiacono, P., Aucejo, E. M., and Hotz, V. J. (2016). University differences in the graduation of minorities in stem fields: Evidence from california. *American Economic Review*, 106(3):525–62.

Arcidiacono, P., Aucejo, E. M., and Spenner, K. (2012). What happens after enrollment? an analysis of the time path of racial differences in gpa and major choice. *IZA Journal of Labor Economics*, 1(1):5.

Avery, R. and Rendall, M. (2002). Lifetime inheritances of three generations of whites and blacks. *American journal of sociology*, 107(5):1300–1346.

Barsky, R., Bound, J., Charles, K. K., and Lupton, J. P. (2002). Accounting for the black-white wealth gap. *Journal of the American Statistical Association*, 97(459):663–673.

Belley, P. and Lochner, L. (2007). The changing role of family income and ability in determining educational achievement. *Journal of Human capital*, 1(1):37–89.

Black, D. and Smith, J. A. (2004). How robust is the evidence on the effects of college quality? evidence from matching. *Journal of Econometrics*, 121(1):99–124.

Black, D. and Smith, J. A. (2006). Estimating the returns to college quality with multiple proxies for quality. *Journal of Labor Economics*, 24(3):701–728.

Black, D., Smith, J. A., and Daniel, K. (2005). College quality and wages in the united states. *German Economic Review*, 6(3):415–443.

Blanchflower, D. G., Levine, P. B., and Zimmerman, D. J. (2003). Discrimination in the small-business credit market. *Review of Economics and Statistics*, 85(4):930–943.

Bleemer, Z., Brown, M., Lee, D., Strair, K., and van der Klaauw, W. (2017). Echoes of rising tuition in students' borrowing, educational attainment, and homeownership in post-recession america. Technical Report Staff Report No. 820, Federal Reserve Bank of New York, New York.

Blundell, R. and Powell, J. L. (2003). Endogeneity in nonparametric and semiparametric regression models. *Econometric society monographs*, 36:312–357.

Bound, J., Lovenheim, M. F., and Turner, S. (2010). Why have college completion rates declines? an analysis of changing student preparation and collegiate resources. *American Economic Journal: Applied Economics*, 2:129–157.

Bound, J. and Turner, S. (2011). Dropouts and diplomas: The divergence in collegiate outcomes. In Hanushek, E., Machin, S., and Woessmann, L., editors, *Handbook of the Economics of Education*, volume 4, pages 573–613. Elsevier B. V.

Browning, M., Gørtz, M., and Leth-Petersen, S. (2013). Housing wealth and consumption: A micro panel study. *The Economic Journal*, 123(568):401–428.

Cameron, S. and Heckman, J. J. (1998). Life cycle schooling and dynamic selection bias: Models and evidence for five cohorts of american males. *Journal of Political Economy*, 106:262–333.

Cameron, S. and Heckman, J. J. (2001). The dynamics of educational attainment for black, hispanic, and white males. *Journal of Political Economy*, 109:455–99.

Cameron, S. and Taber, C. (2004). Estimation of educational borrowing constraints using returns to schooling. *Journal of Political Economy*, 112:132–182.

Card, D. (1995). Using geographic variation in college proximity to estimate the returns to schooling. In Christofides, L. N., Grant, E. K., and Swidinsky, R., editors, *Aspects of Labour Market Behaviour: Essays in Honor of John Vanderkamp*, pages 201–221. University of Toronto Press.

Carroll, C. D., Otsuka, M., and Slacalek, J. (2011). How large are housing and financial wealth effects? a new approach. *Journal of Money, Credit and Banking*, 43(1):55–79.

Cavalluzzo, K. and Wolken, J. (2005). Small business loan turndowns, personal wealth, and discrimination. *The Journal of Business*, 78(6):2153–2178.

Charles, Kerwin Kofi, E. H. and Stephens, M. (2008). Rates for vehicle loans: race and loan source. *American Economic Review*, 98(2):315–20.

Charles, K. K. and Hurst, E. (2002). The transition to home ownership and the black-white wealth gap. *Review of Economics and Statistics*, 84(2):281–297.

College Board (2015). Trends in student aid 2015. Technical report, trends.collegeboard.org.

College Board (2017). Trends in student aid 2017. Technical report, trends.collegeboard.org.

Conley, D. (2001). Capital for college: Parental assets and postsecondary schooling. *Sociology of Education*, pages 59–72.

Cooper, D. and Luengo-Prado, M. J. (2015). House price growth when children are teenagers: A path to higher earnings? *Journal of Urban Economics*, 86:54–72.

Cooper, D. and Wang, C. (2014). Student loan debt and economic outcomes. Unpublished manuscript, Federal Reserve Bank of Boston.

DeAngelo, L., Franke, R., Hurtado, S., Pryor, J. H., and Tran, S. (2011). Completing college: Assessing graduation rates at four-year institutions. *Los Angeles: Higher Education Research Institute, UCLA*.

DeNavas-Walt, C. and Proctor, B. D. (2015). Income and poverty in the united states: 2014. Technical Report Current Population Reports, P60-252, U.S. Census Bureau.

Deng, Y., Ross, S. L., and Wachter, S. M. (2003). Racial differences in homeownership: the effect of residential location. *Regional Science and Urban Economics*, 33(5):517–556.

Dillon, E. W. and Smith, J. A. (2017a). The consequences of academic match between students and colleges. Technical Report Working Paper No. 6344, CESIfo.

Dillon, E. W. and Smith, J. A. (2017b). Determinants of the match between student ability and college quality. *Journal of Labor Economics*, 35(1):45–66.

Do, C. (2012). Withdrawing home equity: Differences across race and ethnicity. *Housing Studies*, 27(3):299–323.

Doren, C. and Grodsky, E. (2016). What skills can buy: transmission of advantage through cognitive and noncognitive skills. *Sociology of education*, 89(4):321–342.

Faber, J. W. and Rich, P. M. (forthcoming). Financially overextended: College attendance as a contributor to foreclosures during the great recession. *Demography*.

Freedman, V. A. and Schoeni, R. (2016). Generating nationally representative estimates of multi-generational families and related statistics for blacks in the psid. *PSID Technical Paper Series*, 16(1).

Gabriel, S. A. and Rosenthal, S. S. (2005). Homeownership in the 1980s and 1990s: aggregate trends and racial gaps. *Journal of Urban Economics*, 57(1):101–127.

Gittleman, M. and Wolff, E. N. (2004). Racial differences in patterns of wealth accumulation. *Journal of Human Resources*, 39(1):193–227.

Grieco, E. M. and Cassidy, R. C. (2001). March.overview of race and hispanic origin. us bureau of the census. 2000 census briefs. Technical report, US Census Bureau.

Heeringa, S. G. and Connor, J. H. (1999). 1997 panel study of income dynamics analysis weights for sample families and individuals. *Manuscript. Ann Arbor: Institute for Social Research, University of Michigan*.

Hotz, V. J., Wiemers, E. E., Rasmussen, J., and Koegel, K. M. (2018). The role of parental wealth and income in financing children's college attendance and its consequences. (Working Paper No. 25144).

Humes, K. R., Jones, N. A., and Ramirez, R. R. (2011). Overview of race and hispanic origin: 2010 (report no. c2010br-02). *Retrieved from United States Census Bureau: http://www. census. gov/prod/cen2010/briefs/c2010br-02. pdf*.

Jez, S. J. (2014). The differential impact of wealth versus income in the college-going process. *Research in Higher Education*, 55(7):710–734.

Kane, T. J. and Rouse, C. E. (1995). Labor-market returns to two- and four-year college. *American Economic Review*, 85(3):600–614.

Keane, M. and Wolpin, K. I. (2001). The effect of parental transfers and borrowing constraints on educational attainment. *International Economic Review*, 42:1051–1103.

Killewald, A. and Bryan, B. (2016). Does your home make you wealthy? *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 2(6):110–128.

Killewald, A., Pfeffer, F. T., and Schachner, J. N. (2017). Wealth inequality and accumulation. *Annual Review of Sociology*, 43:379–404.

Kochhar, R., Taylor, P., and Fry, R. (2011). *Wealth gaps rise to record highs between Whites, Blacks and Hispanics*. Pew Research Center Washington, DC.

Krivo, L. J. and Kaufman, R. L. (2004). Housing and wealth inequality: Racial-ethnic differences in home equity in the united states. *Demography*, 41(3):585–605.

Lochner, L. and Monge-Naranjo, A. (2012). Credit constraints in education. *Annu. Rev. Econ.*, 4(1):225–256.

Lochner, L. J. and Monge-Naranjo, A. (2011). The nature of credit constraints and human capital. *American economic review*, 101(6):2487–2529.

Lochner, Lance Stinebrickner, T. and Suleymanoglu, U. (2018). Parental support, savings and student loan repayment. National Bureau of Economic Research.

Lovenheim, M. F. (2011). The effect of liquid housing wealth on college enrollment. *Journal of Labor Economics*, 29(4):741–771.

Lovenheim, M. F. and Reynolds, C. L. (2013). The effect of housing wealth on college choice: Evidence from the housing boom. *Journal of Human Resources*, 48(1):1–35.

McFarland, J., Hussar, B., de Brey, C., Snyder, T., Wang, X., Wilkinson-Flicker, S., Gebrekristos, S., Zhang, J., Rathbun, A., Barmer, A., Bullock Mann, F., and Hinz, S. (2017). *The Condition of Education, 2017*. U.S. Department of Education, National Center for Education Statistics.

McFarland, J., Hussar, B., Wang, X., Zhang, J., Wang, K., Rathbun, A., and Mann, F. (2018). The condition of education 2018 (nces 2018-144). washington, dc: National center for education statistics, us department of education.

McGonagle, Katherine A., S. R. F. S. N. and Freedman, V. A. (2012). The panel study of income dynamics: overview, recent innovations, and potential for life course research. *Longitudinal and Life Course Studies*, 3(2):268–284.

McKernan, S.M., R. C. S. M. and Zhang, S. (2014). Do racial disparities in private transfers help explain the racial wealth gap. *Demography*, 51(3):949–974.

Menchik, P. L. and Jianakoplos, N. A. (1997). Black-white wealth inequality: is inheritance the reason? *Economic Inquiry*, 35(2):428–442.

Mezza, A. A., Ringo, D. R., Sherlund, S. M., and Sommer, K. (2015). On the effect of student loans on access to homeownership. Technical Report Finance and Economics Discussion Series 2016-010, Board of Governors, Federal Reserve System,, Washington.

Nam, Yunju, D. H. W. D. J. and Price, A. (2015). Bootstraps are for black kids: Race, wealth, and the impact of intergenerational transfers on adult outcomes. Technical report, Oakland, CA: Insight Center for Community Economic Development.

O'Brien, R. L. (2012). Depleting capital? race, wealth and informal financial assistance. *Social Forces*, 91(2):375–396.

Paiella, M. and Pistaferri, L. (2017). Decomposing the wealth effect on consumption. *Review of Economics and Statistics*, 99(4):710–721.

Petrin, A. and Train, K. (2010). A control function approach to endogeneity in consumer choice models. *Journal of marketing research*, 47(1):3–13.

Pfeffer, F. T. and Killewald, A. (2015). How rigid is the wealth structure? intergenerational correlations of family wealth. *Population Studies Center, University of Michigan*.

Rothstein, J. and Rouse, C. E. (2011). Constrained after college: Student loans and early-career occupational choices. *Journal of Public Finance*, 95:149–163.

SallieMae (2017). How america pays for college 2017. Technical report, Sallie Mae Bank.

Scheessele, R. M. (2002). Black and white disparities in subprime mortgage refinance lending. Technical report, US Department of Housing and Urban Development, Office of Policy Development and Research.

Schoeni, R. F., Bianchi, S. M., Hotz, V. J., Seltzer, J. A., and Wiemers, E. E. (2015). Intergenerational transfers and rosters of the extended family: A new substudy of the panel study of income dynamics. *Longitudinal and Life Course Studies*, 6(3):319–330.

Scott, M., Bailey, T., and Kienzl, G. (2006). Relative success? determinants of college graduation rates in public and private colleges in the u.s. *Research in Higher Education*, 47(3):249–279.

Scott-Clayton, J. and Li, J. (2016). Black-white disparity in student loan debt more than triples after graduation. *Economic Studies, Volume 2 No. 3*.

Sharp, G. and Hall, M. (2014). Emerging forms of racial inequality in homeownership exit, 1968–2009. *Social Problems*, 61(3):427–447.

Stock, J. H. and Staiger, D. (1997). Instrumental variables regression with weak instruments. *Econometrica*, 65(3):557–586.

Wheeler, C. H. and Olson, L. M. (2015). Racial differences in mortgage denials over the housing cycle: Evidence from us metropolitan areas. *Journal of Housing Economics*, 30:33–49.

Wolff, E. N. (2016). Household wealth trends in the united states, 1962 to 2013: What happened over the great recession? *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 2(6):24–43.

Wooldridge, J. M. (2014). Quasi-maximum likelihood estimation and tests for non-linear models with endogenous explanatory variables. *Journal of Econometrics*, 182:226–234.

Biography

Joshua Brimhall Rasmussen was born on July 12, 1988 in Portland, Oregon. He graduated from Brigham Young University in 2012 with bachelor's degrees in Mathematics and Economics. Later that year, he entered the Ph.D. program in Economics at Duke University. He was awarded his M.A. in Economics from Duke in 2014 and completed his Ph.D. in Economics in July of 2019.