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

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October 11, 2021

Forthcoming in the *Journal of Human Resources*

Abstract

This paper examines the influence of parental wealth and income on children's college attendance and parents' financing decisions and on whether children graduate from college. We also examine whether parental financing affects the subsequent indebtedness of parents and children. We find 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. We show descriptive evidence that parents' financing of their children's college attendance increases parents' subsequent indebtedness but does not reduce their children's indebtedness, including their student loan debt.

*This research and the Roster and Transfers Module in the 2013 Wave of the PSID were funded by grant P01AG029409 from the National Institute on Aging. We thank co-editor, Mike Lovenheim and the referees for useful comments that improved this article. We also thank Joe Altonji, Breno Braga, Rajashri Chakrabarti, Jim Heckman, Arnaud Maurel, Adam Kapor, Lance Lochner, participants in seminars at Brown, University of Western Ontario and UCLA, and those at the PSID Conference on "New Directions in Study of Intergenerational Transfers," the HCEO Conference on "Human Capital Formation and Family Economics," the New York Fed Bank Conference on "Higher Education Financing & Costs and Returns of Higher Education," the 2017 Southern Economics Association Meetings, Michael Lovenheim and two referees for comments on earlier drafts of this paper.

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1 Introduction

Parents have long been a primary source of financial support for their children's post-secondary education with estimates suggesting that parents cover over 30% of college costs.[1] In this paper we use unique data on parental transfers for college in the Panel Study of Income Dynamics (PSID) to analyze the role that parental resources play in whether children attend college with financial support from parents and the consequences of this support. The dramatic increase in the costs of a college education in the U.S over the past 30 years has challenged the ability of parents and children to finance a college degree and families' decisions about college financing may have long-run impacts on educational outcomes and financial circumstances of both parents and children.[2]

A substantial empirical literature has examined the impact of parental resources on their children's college outcomes. The premise underlying the empirical literature, and the models of parents' investment in their children's human capital in the presence of credit constraints that motivate it, is that parents use their income and wealth to finance the cost of their children's college attendance (Keane and Wolpin, 2001; Lochner and Monge-Naranjo, 2011, 2012). But there is little evidence on parental provision of financial support for their children's college education as a direct mechanism.

This paper provides some of the first direct evidence on whether parental financial resources affect the likelihood and magnitude of financial transfers parents provide for their children's

[1] 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).

[2] 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).

college education. We use data from the 2013 PSID and the Roster and Transfers Module which includes information from parents 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 begin by reexamining the relationship between family financial resources and college outcomes focusing on the role of parental transfers for college. The approach we take is similar to Lovenheim (2011) and Lovenheim and Reynolds (2013), which examine the effects of housing wealth on college attendance and attendance at the flagship state universities. We implement a similar empirical strategy, exploiting the detailed geographic data in the PSID to use local housing and labor market conditions as instrumental variables for wealth and income.[3]

Examining the effect of parental resources on transfers for schooling directly is important for at least four reasons. First, by examining the mechanism linking parents' resources to the postsecondary schooling choices of children, we strengthen the evidence that the relationship is not merely a consequence of the correlation between these resources and unobserved ability or preferences of students and their families.

Second, understanding the direct mechanism of parental transfers for schooling is important because eligibility for financial aid is based on a students' family income and some forms of wealth. Most colleges and many states base students' eligibility for financial aid on students' and parents' income and financial assets reported on their Free Application for Federal Student Aid (FASFA) forms. Though students and parents are not required to report the value of

[3]Our approach also is 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, Gørtz and Leth-Petersen (2013), and Carroll, Otsuka and Slacalek (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.

or equity in the home in which they reside, parents' housing wealth may affect the college attendance and graduation outcomes of students and whether parents provide financial support to their children out of current income or through the use of home equity loans.[4]

Third, the likelihood and amount of financial support that parents may provide to children is likely to depend on the liquidity of parental financial resources. For example, parental wealth in the form of home equity or certain types of assets may be less liquid than sources of income such as salaries. Thus, it is important to separately examine parental income and housing wealth to understand how parental resources translate into the incidence and magnitude of parental transfers for college. Parents may also change the source of financing, from current income to home equity loans for example, as a child progresses through to graduation.

Finally, parental transfers for schooling and how they are funded may affect the level and form of debt that students and their parents have in the long-run. Understanding intergenerational tradeoffs in the accumulation of debt for college remains relatively understudied in the literature.

We find that increases in parents' income and wealth increase the likelihood of children attending college through the mechanism of parental transfers. 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. Finally, we show descriptive evidence that parental transfers for college increase the subsequent indebtedness of parents but do not reduce the indebtedness of children and that parents appear to rely more heavily on housing debt to finance transfers for college after their child has completed at least one year of college.

This paper adds to the large existing literature examining the effect of parental resources on

[4]The Higher Education Amendments of 1992 expressly excluded home equity from the determination of the "expected family contribution" towards college costs.

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). Though the importance of parental income has increased over time, family financial constraints do not explain all of the gap in college attendance between children from low- and high-income families (Belley, Frenette and Lochner, 2014; Bulman et al., 2021; Hilger, 2016).

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 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.

We add to this literature in several ways. First and foremost, we focus on the mechanism

– that is, whether parental income and wealth increase college attendance by increasing the likelihood of financial transfers for schooling. Second, we examine the effect of parental housing wealth and income not just on college attendance but also on college graduation. Examining the effects on college graduation is important because graduation rates remain low even as college attendance has increased (Bound, Lovenheim and Turner, 2010; McFarland et al., 2017). Third, we analyze the effect of both parental wealth and income on college attendance and financing decisions which we show to be important.

Fourth, we look at the effects of housing wealth over a broader period (1997-2013) than Lovenheim (2011). 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.

Finally, we consider the longer run consequences of parental financing decisions on the parent's and child's subsequent indebtedness. A great deal of attention has been paid to the rising levels of student loan debt and its consequences in young adulthood. Student debt persists long after students 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., 2020; Cooper and Wang, 2014; Bleemer et al., 2017).

Parents, too, take on debt to help finance their child's college education.[5] Yet less is known about how parents' financing of their children's education affects the subsequent indebtedness of parents and their children. Faber and Rich (2018) show that commuting zones that experienced

[5]Based on the 2017 survey cited in footnote 1, 27% of students' college costs were financed by loans, with 30% taken by parents and 70% by the student.

increases in the rate of college attendance had increases in home foreclosures in subsequent years which they link to parental financing of children's college education. Lochner, Stinebrickner and Suleymanoglu (2018) look within families and show that access to parental financial transfers after college reduce student debt repayment problems in the Canada Student Loan Program. We add to this literature by looking within families and tracing the relationship between parental financial transfers for college and parent and student debt in the years during and after college.

The remainder of the paper is organized as follows. In Section 2 we describe the PSID data and the samples and measures we use in our analyses. In Section 3, we consider the effect of parental income and wealth in children's college attendance and graduation and parental financing decisions. We discuss the potential endogeneity of parental income and wealth in estimating their impacts on these decisions and an instrumental variables strategy for addressing it. In Section 4, we consider the consequences of parents' financing decisions on the subsequent indebtedness of parents and their children. We offer concluding comments in Section 5.

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.

2.1 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 transfers 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 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 years in which the child is in their mid to late 20s 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, 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.[6] 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.[7] 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.[8] 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 $N = 2{,}866$ 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 graduation, 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 where the child turned 18 prior to 2009.[9] We further limit the sample to children who attended college which yields a sample size of 1,418 parent-child pairs.

[6]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.

[7]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.

[8]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.

[9]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.

For the outcome of parental and child debt, we examine outcomes when the child is age 20, 24, and 28 to trace out the path of parental debt over time. At age 24, this restriction yields a sample size of 2,580 for parental housing debt and 2,571 for parental non-housing debt that includes credit card debt, and auto loan debt. For children, measures of indebtedness are only available for PSID heads and wives or for members of the TA study. Using these two sources of data, we construct a sample to examine outcomes at age 20, 24, and 28. We have a total sample of 1,756 adult children with which to analyze children's 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 because the PSID only started asking about this source of debt separately in 2011. The corresponding sample sizes for parents' and children's indebtedness when children are age 20 are approximately the same as when they are age 24 and smaller when they are age 28.

Table 1 provides a summary of the sizes of these various samples that we use in our analysis below. In Appendix A, 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.

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 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 it 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 versus 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 were asked the total amount they provided to each of their children for educational expenses 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$.[10]

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, 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

[10]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.

PSID family data.

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. We also measure whether a parent has a home equity loan or line of credit. These measures are obtained in the PSID wealth module which has been included in every survey since 1997.[11] 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.

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

In this section we examine children's college attendance decisions, parents' role in helping to finance their children's choices and whether the children graduate from college. Our focus is on how these decisions are affected by parents' wealth and income. We begin by defining the notation and discussing the empirical distributions of parental wealth and income across college attendance and financing decisions in our sample. We then describe our econometric strategies for estimating the causal impacts of parental wealth and income on these outcomes.

[11]The PSID asks household heads whether they have any home equity loans at each wave. It does not ask the respondent to provide the remaining balances on such loans, even though it prompts respondents to include such loan balances in their overall mortgage debt.

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 in the year the child is age 18, t_{18_j}:

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

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

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

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

For those who attended college and received financial help from their parents, ($EduFin2_{ijt_{18_j}} = 1$), we have a measure the *amount of financial help* parent i provided to child j in support of the child's college attendance. Denote this amount as $CollTrans_{ijt_{18_j}}$. For those who attended college, ($EduFin1_{ijt_{18_j}} = 1$ or $EduFin2_{ijt_{18_j}} = 1$), we define $Grad_{ijmt_{18_j}}$ is the 0/1 indicator for whether the child graduated from college.

Table 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. While the mean amount of parental transfers for the full sample is \$7,800, among children who receive such a transfer, the average value is \$29,060. We also display in Table 2, college graduation statistics. Only 27% of the offspring in our sample graduate from college, even though 56% attended college, so the college completion rate is 40% in our sample. College completion is higher for children attending college with parental financial

support compared to those attending without it.

Finally, 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:

$$H_{imt_{18_j}} = MktValue_{imt_{18_j}} - MortBal_{imt_{18_j}}. \tag{1}$$

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 we display how parental housing wealth, $H_{imt_{18_j}}$, and income, $Y_{imt_{18_j}}$, differ by college attendance and parental financing decisions. The patterns of parental net equity and income are predictable. The parents of children who attend college without financial support have \$21,200 more in net home equity and \$22,300 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.

To model parental-child college and financing decisions, let $U_{kijmt_{18_j}}$ denote the utility, or payoff, for choosing $EduFink_{ij,18_j}$, $k = 0, 1, 2$, 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 (t_{18_j}) are given by:

$$\begin{aligned} U_{kijmt_{18_j}} = {} & \lambda^U_{k0} + \lambda^U_{k1} H_{imt_{18_j}} + \lambda^U_{k2} Y_{imt_{18_j}} + \lambda^U_{k3} X_{ij} + \lambda^U_4 M_{kmt_{18_j}} + \phi^U_{kt_{18_j}} + \delta^U_{k\ell t_{18_j}} \\ & + \varepsilon^U_{kijmt_{18_j}}, k = 0, 1, 2, \end{aligned} \tag{2}$$

where the $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are defined above; X_{ij} is a vector of demographic characteristics of parents i and their j^{th} child; $M_{kmt_{18_j}}, k = 0, 1, 2$, are the wage "returns" associated with each choice, k, that prevailed in the local market, m, in which the household resided at t_{18_j}; $\phi_{t_{18_j}}$; and $\delta_{\ell t_{18_j}}$ are calendar year and location-of-residence *fixed effects*, respectively,[12] and $\varepsilon^U_{kijmt_{18_j}}$ are remaining choice-specific unobserved parent and child traits or factors that affect the utility of these choices.

The vector X_{ij} includes a rich set of observed parental characteristics (parental age, marital status, race, and education of the parent), measures of family structure (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 Appendix A for the list of these variables and their sample means.)

The choice- and market-specific wage returns, $M_{kmt_{18_j}}$, act like market prices of discrete products, e.g., makes of automobiles, in consumer choice models (McFadden, 1974; Train, 1986). To form them, we use industry- year- and county-of-residence-specific average weekly wage data from the Quarterly Census of Employment and Wages (QCEW) and weight each industry's average wage by the share of workers aged 25-29 working in that industry in year t_{18} for young adults who did not attend college and for young adults with a 4-year or associate degree to measure the returns of not attending college and attending college choices, respectively, where the shares are calculated at the national level from Current Population Survey. In $M_{kmt_{18_j}}$, we

[12]Our preferred location-of-residence indicators are the MSAs in which the household resides when the child is age 18 or the state-of-residence, if the household does not live in an MSA. We use this set of fixed effects in the estimation of the amount of transfers $CollTrans$ and college graduation outcomes described below. But, for the estimation of the payoff functions for the college attendance and financing choices in (2), we were only able to include state-of-residence fixed effects in the multinomial logit specification due to the available sample size. As discussed below, the local market measures of the choice-specific average wages, M_{km}, are, in general, measured at finer levels of geography, i.e., counties, in which households reside.

also include the local wages and employment rates of teenage workers calculated in the same way as the choice-specific wage controls, as well as the college- and associate's degree wage premia in each year at the state level. Finally, we include the (calendar) time dummies, $\phi^U_{kt_{18_j}}$ to account for temporal factors, such as the aggregate state of the economy, and state-of-residence dummies, δ^U_{ks}, that may affect college attendance and financing decisions.

The optimal college/financing choice decision-rule for child j, $k^\dagger$, is given by:

$$k_i^\dagger = \arg\max_k U_{kijmt_{18_j}}, k = 0, 1, 2. \tag{3}$$

Assuming that the random variables, $\varepsilon^U_{kijmt_{18_j}}$, have Type II extreme value distributions that are independent across choices, the model of college attendance and its financing choices in (2) and (3) can be estimated as a multinomial logit model so long as $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are assumed to be exogenous.

The assumption that parental wealth ($H_{imt_{18_j}}$) and income ($Y_{imt_{18_j}}$) are exogenous in the payoff functions of (2) is potentially a strong one. The inclusion of measures of family background and child characteristics (X_{ij}), choice-specific local market average wages ($M_{kmt_{18_j}}$), and time and location fixed effects ($\phi^U_{kt_{18_j}}$ and $\delta^U_{k\ell t_{18_j}}$) in the payoff functions in (2) reduces the potential for correlation between parental income or wealth and the $\varepsilon^U_{kijmt_{18_j}}$s. But, some correlation may remain that can bias the estimation of the λs in (2).

To address any remaining correlation, we employ a control function estimator (Blundell and Powell, 2003; Wooldridge, 2015) applied to the multinomial logit specification (Petrin and Train, 2010; Wooldridge, 2014) characterizing parents' choice problem in (2) and (3). The idea behind the control function correction is to formulate proxy variables that capture the parts of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ that are correlated with the $\varepsilon^U_{kijmt_{18_j}}$s in the payoff functions and then control for a function of these proxies in the estimation of the choice model implied by (3). To proceed, we

express the potentially endogenous variables, $R_{imt_{18_j}}, R = H, Y$, as the following functions of exogenous variables

$$\begin{aligned} R_{ijmt_{18_j}} &= \pi_0^R + \pi^R Z_{imt_{18_j}} + \nu^R_{imt_{18_j}} \\ &= \pi_0^R + \pi_1^R Z_{1imt_{18_j}} + \pi_2^R Z_{2imt_{18_j}} + \nu^R_{imt_{18_j}}, R = H, Y, \end{aligned} \tag{4}$$

where $Z_{1imt_{18_j}} = (X_{ij}, M_{1mt_{18_j}}, M_{2mt_{18_j}}, \phi_{t_{18_j}}, \delta_{\ell t_{18_j}})$ are the exogenous variables that enter the payoff functions directly, $Z_{2imt_{18_j}}$ is a vector of instrumental variables, i.e., exogenous variables excluded from the payoff functions, and $\nu^R_{imt_{18_j}}$, an additively separable error term.[13] We further assume that while both the $\varepsilon^U_{kijm,t_{18_j}}$s and those in the "projection" equations in (4), $\nu^R_{imt_{18_j}}$, are independent of $Z_{imt_{18_j}}$, these projection errors are correlated with the errors in the payoff functions. Together, these assumptions imply

$$\begin{aligned} D(\varepsilon^U_{kijt_{18_j}} | Z_{ijt_{18_j}}, H_{ijt_{18_j}}, Y_{ijt_{18_j}}) &= D(\varepsilon^U_{kijt_{18_j}} | Z_{ijt_{18_j}}), \nu^H_{ijt_{18_j}}, \nu^Y_{ijt_{18_j}}) \\ &= D(\varepsilon^U_{kijt_{18_j}} | \nu^H_{ijt_{18_j}}, \nu^Y_{ijt_{18_j}}), k = 0, 1, 2, \end{aligned} \tag{5}$$

i.e., that the conditional distribution of the $\varepsilon^U_{kijmt_{18_j}}$ in the payoff functions (2) depend on $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ only through the projection errors, the $\nu^R_{imt_{18_j}}$s, for parental wealth and income in (4). By conditioning on a (control) function of these projection errors, $CF(\nu^H_{imt_{18_j}}, \nu^Y_{imt_{18_j}}; \theta)$, in the estimation of the above college attendance and parental financing choice model, one can obtain consistent estimators for λ^U_{k1} and λ^U_{k2} as well as the other parameters in (2) even when $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are assumed to be endogenous. In the case where the control functions is linear in the projection errors, i.e., $CF(\nu^H_{imt_{18_j}}, \nu^Y_{imt_{18_j}}; \theta) \equiv \theta^U_{k1}\nu^H_{imt_{18_j}} + \theta^U_{k2}\nu^Y_{imt_{18_j}}$, we express

[13] We maintain the assumption that the $R_{imt_{18_j}}$s are linear functions of $Z_{imt_{18_j}}$, but restrictive functional forms can be employed to obtain semiparametric versions of control function estimators. See Blundell and Powell (2004); Blundell and Matzkin (2014).

these control-function-adjusted payoffs as:

$$U_{kijmt_{18_j}} = \lambda^U_{k0} + \lambda^U_{k1} H_{imt_{18_j}} + \lambda^U_{k2} Y_{imt_{18_j}} + \lambda^U_{k3} X_{ij} + \lambda^U_4 M_{kmt_{18_j}} + \phi^U_{kt_{18_j}} + \delta^U_{k\ell t_{18_j}}$$
$$+ \theta^U_{k1} \nu^H_{imt_{18_j}} + \theta^U_{k2} \nu^Y_{imt_{18_j}} + \tilde{\varepsilon}^U_{kijmt_{18_j}}, k = 0, 1, 2. \quad (6)$$

Following Petrin and Train (2010), we assume that the $\tilde{\varepsilon}^U_{kijmt_{18_j}}$s have Type II extreme value distributions that are independent across choices.

Control function estimation proceeds in two steps. First, one estimates the projection equations in (4) and retrieves the residuals, denoted by $\hat{\nu}^H_{imt_{18_j}}$ and $\hat{\nu}^Y_{imt_{18_j}}$, respectively. Second, one includes these residuals in place of $\nu^H_{imt_{18_j}}$ and $\nu^Y_{imt_{18_j}}$ in (6). It follows from Blundell and Powell (2003) and Petrin and Train (2010) that the resulting estimator of the parameters in (2) is consistent. We use the bootstrap method to calculate standard errors to account for the estimation error of the first-stage parameters in the second-stage correction terms, $\hat{\nu}^H_{imt_{18_j}}$ and $\hat{\nu}^Y_{imt_{18_j}}$.

The validity of using the control function estimation method hinges on the validity of the exclusion restrictions, i.e., that $Z_{2imt_{18_j}}$ is independent of the unadjusted payoff function errors $\varepsilon^U_{kijmt_{18_j}}$. As we discuss below, we use measures of changes in local average housing prices and in local average wages as our exclusion restrictions. Below in Section 3.2, we define our instrumental variables, discuss their plausibility and provide the conditions required for their validity.

To estimate the impact of parental housing wealth and household income on the amount of the parents' transfer, $CollTrans_{ijmt_{18_j}}$, for those who attend college, we use the following population regression function:

$$CollTrans_{iimt_{18_j}} = \lambda^T_0 + \lambda^T_1 H_{imt_{18_j}} + \lambda^T_2 Y_{imt_{18_j}} + \lambda^T_3 X_{ij} + \lambda^T_4 M_{2mt_{18_j}} + \phi^T_{t_{18_j}} + \delta^T_{\ell t_{18_j}} + \varepsilon^T_{imt_{18_j}}, \quad (7)$$

for those children who attended college and received a transfer, i.e., $EduFin2 = 1$, where the control variables are the same as those included in the payoff functions in (2) for these two choices, including the local wage return for workers with some college, $M_{2mt_{18_j}}$ and location-specific fixed effects.[14]

To estimate the effects of parental income and wealth on whether child j graduated from college, $Grad_{ijmt_{18_j}}$, we use the corresponding population regression function given by:

$$Grad_{ijmt_{18_j}} = \lambda_0^G + \lambda_1^G H_{imt_{18_j}} + \lambda_2^G Y_{imt_{18_j}} + \lambda_3^G X_{ij} + \lambda_4^G M_{2mt_{18_j}} + \phi_{t_{18_j}}^G + \delta_{\ell t_{18_j}}^G + \varepsilon_{ijmt_{18_j}}^G, \quad (8)$$

for those children who attended college, regardless of receiving a parental transfer, i.e., $EduFin2 = 1$ or $EduFin2 = 1$, where we use the same control variables and fixed effects used in (7).

Two issues arise in the estimation of the effects of parental wealth and income in (7) and (8). First, as with the college attendance and financing choices, $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are potentially endogenous. Second, positive transfers only occur for children who attend college and whose parents help fund it, i.e., $EduFin2 = 1$, and a child can only graduate if they attend college, i.e., $EduFin1 = 1$ or $EduFin2 = 1$. Consider the consequences of this conditioning for the estimation of the determinants of $CollTrans$ in (7). Estimation of the parameters in (7) by methods like ordinary least squares will be subject to selection bias to the extent that the unobserved factors affecting how much financial support contributing parents provide for children's college costs, i.e., the $\varepsilon_{imt_{18_j}}^T$s in (7), are correlated with unobserved factors determining the utility payoffs of college attendance and financing choices, i.e., the $\varepsilon_{kimt_{18_j}}^U$s in (2). This bias will arise under these conditions, even if $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are assumed to be exogenous variables in (7). A similar argument applies to the estimation of the determinants of the $Grad$

[14] As discussed in footnote 12, we were only able to include state-of-residence fixed effects in the estimation of the choice-specific payoff functions in (2). However, in the estimation of (7) – and of (8) discussed below – we are able to include both MSA and rest-of-state fixed effects for place-of-residence.

outcome in (8).

To address the potential for selection bias in the estimation of (7) and (8) when $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are treated as exogenous, we employ a variant of the two-stage, selection-correction strategy first developed by Heckman (1979) and extended by others (Dubin and McFadden, 1984; Dahl, 2002) and summarized in Bourguignon, Fournier and Gurgand (2007). Let $Attend_{ij}$ be an indicator variable equal to 1 if child j of parent i attends college and zero otherwise.[15] In the first-stage, we estimate a logit model for attending college ($Attend_{ij} = 0, 1$) that includes only exogenous variables in Z_{ij} to form predicted choice probabilities, or "propensity score," for each outcome, i.e., $\widehat{P}(k* = Attend_{ij}|Z_{ij})$, and, following Dahl (2002), include a polynomial function of these choice probabilities as a regressor in (7) to approximate the selection-correction term, and estimate the resulting equation by ordinary least squares.[16] We note that the local market wage returns to non-college educated workers, $M_{0mt_{18_j}}$, does not enter the regression functions for $CollTrans$ and $Grad$ in (7) and (8). Thus, this variable serves as an exclusion restriction to secure non-parametric identification of the selection-correction estimators for both of these outcome.[17]

This selection-correction method can be extended to account for the endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ in either (7) or (8) by estimating the second-stage, selection-corrected transfer amounts equation via instrumental variables (IV) methods, rather than OLS, using instruments described in the next section.[18]

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

[16] We again use the bootstrap method to calculate standard errors to account for the estimation error of the parameters in the first-stage logit specification that enter the second-stage, selection-correction term.

[17] We note that the use of the polynomials of the propensity scores, $\widehat{P}(k* = Attend_{ij}|Z_{ij})$, in the selection corrections of these outcomes would provide a parametric form of identification.

[18] The estimation of this selection-corrected specification assuming $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are exogenous is produced using the Stata ado routine, selmlog, while the IV version is produced with a modified version of this routine, ivsemlog, which is available upon request. (See Bourguignon, Fournier and Gurgand, 2007, for details). The standard errors for the parameters again are obtained via bootstrap.

3.2 Instrumental Variables: Changes in Local Average Housing Prices & Wages as Exclusion Restrictions

Our preferred estimation strategies for the parameters of the college attendance and financing choice payoff functions in (2), the parental transfers equation in (7), and the college graduation equation in (8) require exclusion restrictions to characterize instrumental variables, Z_{2ijt}, to account for the endogeneity of parent's housing wealth, $H_{imt_{18_j}}$, and income, $Y_{imt_{18_j}}$.

Following the approach of Lovenheim and Reynolds (2013), we use changes in average local housing market prices to instrument for parents' housing wealth. Changes in housing prices in parents' local market affect the equity parents have in their home, over and above any actions taken by parents, such as paying down their mortgage or making improvements to their home. Furthermore, such variation is plausibly exogenous to the extent that it is driven primarily, if not exclusively, by market forces beyond the control of parents.

Our changes-in-local-housing-prices instrument is constructed as follows. For 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 we define the local housing market at the zip code level and 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}.[19]

[19]In the specifications of the payoff functions in (2), as well as the other outcome equations described below, we include dummy variables for the level-of-geography that was used to measure these housing price indices for

Using these housing price indices, we construct the percentage change in this index over a 4-year period centered on year t_{16_j}, $\Delta\%HPI_{mt_{18_j}} \equiv (HPI_{mt_{18_j}} - HPI_{mt_{14_j}})/HPI_{mt_{14_j}}$. 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 used to construct this instrument. Furthermore, the impacts of changes in these price indices on parents' current home equity, $H_{imt_{18_j}}$, will differ depending on the level of parents' home equity at the time of the price changes. To adjust for these differences, we "scale" $\Delta\%HPI_{mt_{18_j}}$ by the parents' net home equity in year t_{16_t}, i.e., their *lagged* home equity, to form our housing market instrument:[20]

$$\Delta HPI_{mt_{18_j}} \equiv H_{imt_{16_j}}[\Delta\%HPI_{mt_{18_j}}]. \tag{9}$$

We note that Lovenheim and Reynolds (2013) use a similar variable to that in (9) as their measure of exogenous changes in parents' housing wealth in their model of college choices. Below, we discuss the potential threats to the validity of this measure as an instrument and how our specification of the payoff functions and transfer equations mitigate these threats.

We adopt a similar approach in defining an instrument for parental income, using changes in local labor market conditions as measured by changes in average wages. In particular, we construct the average annual wages, $\overline{W}^P_{mt}$, for each county, m, in each year, t, using data from the QCEW. We use them to form percentage changes in average local wages in the county-of-residence of the parent when their child was age 16 for the years around t_{16_j}, $\Delta\%\overline{W}^P_{mt_{18_j}} \equiv (\overline{W}^P_{mt_{18_j}} - \overline{W}^P_{mt_{14_j}})/\overline{W}^P_{mt_{14_j}}$, and, for the reasons given above for $\Delta HPI_{mt_{18_j}}$, we also scale it by parent's annual income in year $t_{16,j}$ to construct the following instrumental variable:

$$\Delta W^P_{mt_{18_j}} \equiv Y_{imt_{16_j}}[\Delta\%\overline{W}^P_{mt_{18_j}}]. \tag{10}$$

the market m in which parent i was residing.

[20]Like Lovenheim (2011), we found that trimming the measure in (9) for large positive or negative changes improved the precision of our results.

Similar to using changes in local housing prices, the use of changes in local market average wage levels as instruments presumes that they characterize shifts in the local demand for labor that, in turn, result in changes in parents' income. We discuss the plausibility of this presumption and ways to help ensure its validity below.

While plausible, there are challenges to using the measures defined in (9) and (10) as instruments for $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ in the college choice and financing equations and the amount of parental transfers and college graduation equations. It is well known that parents make their residential locations decisions based, in part, on the quality of local primary and secondary schools and this sorting induces a positive relationship between local housing prices and the quality of local public schools. Furthermore, it is likely that children who are better prepared for college and/or parents with higher educational aspirations for their children are more likely to reside in areas with higher housing prices and appreciation. To the extent that children's academic preparation/ability or parents' aspirations for their children are not controlled for in the choice payoff or parental college transfer equations, the effects of $\Delta HPI_{mt_{18_j}}$ on these decisions will not be channeled exclusively through $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$, thereby violating the exogeneity condition for an instrumental variable. Similarly, changes in labor demand conditions, as measured by $\Delta W_{mt_{18_j}}$, may affect children's college attendance decision, not exclusively through changes in parents' income or wealth but also by changing the labor market returns to children themselves, again leading to a violation of the exogeneity condition.

To mitigate such threats to the validity of our proposed instruments, we note four features of the specifications of our payoff and transfer equations. First, we include a rich set of parental and child background characteristics in X_{ij} to control for heterogeneity in factors like parents' aspirations for their children's college attendance and in children's preparation for college.

Second, we include time and location fixed effects in Z_{1ijt} to absorb some of the longer-run differences generated by endogenous residential sorting associated with school quality and aggregate secular trends. Such controls imply that the variation in our instruments reflect within-market, short-term and idiosyncratic changes in local housing prices or labor market conditions that generates exogenous short-run variation in parents' home equity and/or income.

Third, we follow Lovenheim and Reynolds (2013) in using housing price changes and changes in local labor market wages that occur prior to child j's college choice (at age 18) as our instruments, defining both based on the local market in which parents resided in the year in which the child was age 16. Lagged changes in local housing prices or local wages can affect parents' subsequent home equity and/or income when parents are making their child's college decisions, but are less likely to reflect choices parents might make in anticipation of these decisions, such as selling their home to capture their existing equity for use in financing their child's college education or changing states or localities to be closer to better colleges.

Finally, we include in the vector of local market conditions, $M_{kmt_{18_j}}$, measures that control for the labor market conditions for young adults. These include county-level average wages and employment rates of jobs filled by non-college-bound youth age 16 - 20, and the college- and associate's degree wage premium at the state level. These are in addition to the choice-specific wage returns for non-college and college-educated youth ages 25-29. Even with these controls, it is possible that local changes in wages affects college enrollment decisions directly. However, existing evidence suggests that, to the extent that we have not fully controlled for this channel, the correlation would bias our results away from finding a positive association between wages and enrolling in college. Existing evidence shows that increases in the minimum wage reduce enrollment at U.S. community colleges (Lee, 2020) and Canadian universities, especially

for students with less educated parents (Alessandrini and Milla, 2021). Wages of less skilled workers are also negatively related with high school enrollment (Black, McKinnish and Sanders, 2005). A similar problem may exist for $\Delta H_{mt_{18_j}}$, if local housing booms change the labor market decisions of young adults but evidence suggests that these correlations would also bias our results away from finding an association (Charles, Hurst and Notowidigdo, 2018).

In Appendix Table B.1, we report statistics and p-values for tests of the joint significance of these instruments for our first-stage regressions for both parental net equity and income. The test statistics indicate that our instruments are sufficiently strong. Standard errors are clustered at the level of the MSA of residence of the parent for those that reside in an MSA plus indicators for living in a non-metro area of a state which is the highest level of aggregation for $\Delta HPI_{mt_{18_j}}$.

3.3 Empirical Results

Table 3 presents the results of estimating (2), (7) and (8). For the college choice and financing models in (2), we show estimates of the marginal effects of parental net equity (H) and income (Y) on children's college choices ($EduFin0, EduFin1$ and $EduFin2$) for the unadjusted multinomial logit specification as well as for our preferred estimates based on the control function estimator. For the models of amounts conditional on a transfer in (7), we present selection-corrected OLS and instrumental variables IV regression coefficient estimates for H and Y. Finally, for college graduation outcomes in (8), we present selection-corrected OLS and IV regression estimates for both variables for those who attended college.

Estimates in Panel A of Table 3 imply that a \$10,000 increase in home equity decreases the likelihood that the child does not attend college by 0.41 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 0.37 percentage points, with the first and the last of these effects being statistically significant at least at the 10% level. Similarly, a $10,000 increase in parents' annual income decreases the likelihood that the child does not attend college by 1.94 percentage points, increases the likelihood that they attend college but with no parental transfer by 0.83 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 least at the 5% level.

In Panel B of Table 3 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 0.36 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 1.63 percentage points and decreasing the likelihood of not attending college by 2.17 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 -0.38 and for going to college and receiving financial help is 0.48. In contrast, for parents' net housing equity the elasticities are much smaller at -0.05 and 0.08, 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),

[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.

although only the multinomial logit estimates in Panel A of Table 3 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) and Lochner and Monge-Naranjo (2011, 2012). Moreover the latter effects are statistically significant for both our multinomial and control function specifications. However, what our findings make clear is that the mechanism through which parental income and wealth affect college attendance is through their effects on the likelihood that parents help finance 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 choice are small and not statistically significant for our preferred control function specification.[22]

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 IV, are shown in Panel C of Table 3. 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 \$320, while a comparable increase in parents' income would increase the average amount transferred by \$919. In our preferred IV specification, we find that a \$10,000 increase in home equity increases parental transfers by only \$135 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

[22]We have estimated the results in Table 3 Panel B using instruments that are not scaled by the value of net equity and parental income. The results are similar although the marginal effect of $H_{imt_{18_j}}$ on $EduFin1$ indicates that increases in parental wealth reduces the likelihood of attending college without a parental transfer. We use the scaled instruments because of comparability with Lovenheim (2011) and because the first stage has a higher F-statistic.

income resulting in an average increase in parental transfers of $2,043, 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 (0.099) while the elasticity with respect to parental income is sizable (2.014).

Finally, Panel D of Table 3, shows 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. We find that greater parental housing wealth at the time of their child's college decision increases the probability that their child ultimately graduates from college and is statistically significant at the 5% level.[23] A $10,000 increase in housing wealth increases the probability of their child graduating by 1.02 percentage points, which is a 3.7% increase over the baseline graduation rate of 27% in our sample. We do not find that parents' income when their child was age 18 had a statistically significant effect on college graduation once we control for the endogeneity of family income. Moreover, the effect of parental income on their children's college graduation is relatively small: a $10,000 increase in parental income increases the probability of college graduation by 0.45 percentage points, which is a 1.6% increase. This pattern of the effects of parental resources by type on graduation contrasts with what we found for whether the child attended college at age 18, where parental income had a larger effect on this decision than parental housing wealth.[24]

[23]This finding is in contrast to those in Cooper and Luengo-Prado (2015), who did not detect any effects of parental housing wealth on college graduation. We note that while the latter study used data from the PSID, it did not use data from the 2013 Roster and Transfers module, which, as noted in Section 2, provides educational outcomes, including graduation, for all the adult children of PSID heads and spouses, whereas Cooper and Luengo-Prado (2015) only examined college graduation for those children who became heads or spouses of PSID households.

[24]We also examined the effects of parental wealth and income on the cost and quality of colleges that children attended. This analysis is described in Appendix Appendix C. Therein, we examine the effects on various measures of quality, including the college's tuition, whether the college attended was private or public and an index of the quality of the college attended. In general, we find small and statistically insignificant effects of parental income and wealth on these measures, especially after we correct for the endogeneity of these two variables.

Taken together, our results indicate that both parental wealth and income affect the likelihood of children attending college through whether or not parents help finance it. At the same time, we find that the effects of parental income on college attendance and financing decisions are larger in elasticity terms than those associated with parental wealth. These contrasting effects may be related to whether and how parents' strategy for providing financial help, including taking on debt, is affected by any initial uncertainties they may have about their child's likelihood of completing college. In Section 4, we describe parents indebtedness, including the use of home equity loans, when their children were of college age (18-24). We present descriptive evidence that parents may delay their use of home equity, via home equity loans, to fund their children's college education until after their first year of college. The latter finding may reflect parents' waiting to use their housing equity until they have greater confidence that their children are likely to succeed in college and may explain why housing wealth matters more for whether their children graduate from college than it does for whether they attend it.

4 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 the levels of debt that parents and children hold as the child moves through their 20s. In what follows, we outline our strategy for estimating these relationships, explicitly examining whether children who attend college and their parents accumulate more debt, whether parental financial support for college leaves parents with more debt, and whether such support reduces the amount of debt children accumulate. We trace these debt levels when the child is age 20, 24, and 28 years old to look at age patterns of debt accumulation.

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

Let $Debt_{hnt_{a_j}}$ denote the amount of debt type h for household type, n, where $n = i$ for the parent household and $n = j$ for the child household as of year t_{a_j} when child j is age a. We measure debt levels for parents and children at three ages of the child: $a = 20$ when a child who attends college is likely still a student, $a = 24$, six-years after enrollment and financing decisions and when college education is likely to be completed for most students, and $a = 28$ where we may see parents and children paying off debt or accumulating more debt to attend graduate school. For parents, we examine mortgage debt ($MortBal_{it_{a_j}}$), and all other non-housing debt ($OthDebt_{it_{a_j}}$), measured at the above ages and for children, we examine debt in the form of outstanding student loans ($StudentDebt_{jt_{a_j}}$), as well as total non-housing debt ($OthDebt_{jt_{a_j}}$), both measured at these same ages. Finally, we measure whether parents have a home equity loan at t_{a_j}, defining $Loan_{it_{a_j}}$ as a binary variable, and construct measures at child j's ages $a = 18, 20, 24$ and 28.

In Table 4, we display the mean values of mortgage and non-housing debt and the presence of home equity loans for parents and student loan and other non-housing debt for children at three ages of the child: 20, 24, and 28. As shown in Panel A, mortgage debt is higher for parents whose child attended college than for parents whose child did not attend college and higher for parents who provided financial transfers for college to their child compared to those whose child attended college without financial transfers. For parents whose child did not attend college, mortgage debt declines with the age of the child; for those whose child attended college either with or without parental financial support, parental mortgage debt follows an inverse U-shape with child age. Parents whose child attended college also have higher balances of non-mortgage

debt than parents whose child did not attend college but the difference between parents who helped finance their child's college and those who do not is small. At the time when their child's college enrollment decisions were being made (age 18), 13% of parents had a home equity loan, with the incidence of these loans much lower (8%) for those whose child did not enroll in college and higher (17%) for those parents who helped finance their child's college education. As their children grew older, the presence of home equity loans among parents whose child did not go to college and for those whose child attended college without parental financial help was relatively constant. But the share of parents with home equity loans increased slightly among parents who helped finance their child's college education, rising from 17%, when their child was age 18, to 19%, when they were age 24, which is 4 and 6 percentage points higher at ages 20 and 24, respectively, than among parents whose child went to college without parental support.

With respect to their debt balances of children in early adulthood, Table 4 Panel B shows that average debt balances rise with age. 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. Among those children who went to college and got financial help from their parents, their debt levels were slightly lower than those who went to college without parental help.[25] While, on average, both non-housing debt and student debt increase as children age through their 20s, the continuing rise after age 24 is driven, in large part, by children who attended college. Furthermore, this continuing rise in student loan debt of college attendees after age 24 is consistent with some of these students accumulating further debt with postgraduate studies.

[25]We note that the levels of student debt for those who attended college reported in Panel B of Table 4 are very similar to those estimated by Andreski, Kreisman and Schoeni (2015) based on data on student loans for the PSID TA study. Andreski, Kreisman and Schoeni (2015) note that their estimates are similar to those found in the National Postsecondary Student Aid Survey.

The descriptive findings in Table 4 suggest that parents who help finance their children's college education appear to do so by taking on additional debt, primarily in the form of mortgage debt, and that this increased indebtedness continues beyond their child's time in college. The tabulations in Panel B suggest that college attendance also increases students' indebtedness but that parental support for those who attend college does not reduce it. At issue is the robustness of these findings for factors that may affect both levels of parent and child indebtedness and children's college attendance and parents' financing decisions.

We estimate regression-adjusted marginal differences for $EduFin1$ and $EduFin2$ (relative to $EduFin0$) in parents' and children's debt, where we control for some of the same observed parent and child characteristics used in the analyses of college attendance and financing decisions, college graduation and college quality outcomes discussed in Section 3. In particular, for parents' sources of debt, we estimate:

$$\begin{aligned} Debt_{hit_{a_j}} = \beta^P_{nh0} + \beta^P_{h1} EduFin1_{ij} + \beta^P_{h2} EduFin2_{ij} + \beta^P_{h3} Y_{imt_{a_j}} + \beta^P_{h4} X_{it_{a_j}} \\ + \beta^P_{h5} MktValue_{it_{18_j}} + \phi^P_{ht_{a_j}} + \delta^P_{hm} + u^P_{hit_{a_j}}, \end{aligned} \tag{11}$$

for $Debt_h = MortBal, OthDebt$, and for holding a home equity loan ($Loan = 1$), where $Y_{imt_{a_j}}$ is parents' income in year t_{a_j}, $X_{it_{a_j}}$ is a vector of parent i's characteristics in that year, and $\phi^P_{t_{a_j}}$ and δ^P_s are year and the parents' county fixed effects, respectively. Included in $X_{it_{a_j}}$ are the same characteristics described in Section 3.1 with the addition of contemporaneous non-housing wealth. We also include the value of the parental home at age 18, $MktValue_{it_{18_j}}$ because parents with higher value homes will carry larger mortgage balances when children are in their 20s. Furthermore, all time-varying covariates, including $Y_{imt_{a_j}}$, are measured in year t_{a_j} instead of year t_{18_j} used in our previous analyses. We estimate the specifications in (11) when child j is age 20, 24, and 28.

We also estimate the following specification for two sources of children's debt:

$$Debt_{hjt_{a_j}} = \beta^C_{nh0} + \beta^C_{h1} EduFin1_{ij} + \beta^C_{h2} EduFin2_{ij} + \beta^C_{h3} Y_{jmt_{a_j}} + \beta^C_{h4} X_{jt_{a_j}} + \phi^C_{ht_{a_j}} + \delta^C_{hm} + u^C_{hjt_{a_j}}, \quad (12)$$

for $Debt_h = OthDebt, StudentDebt$, where $Y_{jmt_{a_j}}$ is child j's income in in year t_{a_j}, $X_{nt_{a_j}}$ is a vector of child j's characteristics at child age a, and $\phi^C_{t_{a_j}}$ and δ^C_s are year and the child's state-of-residence fixed effects, respectively. Included in $X_{nt_{a_j}}$ are all of the characteristics of the parent described in Section 3.1 where all time-varying covariates are measured in year t_{a_j}, along with an indicator variable for coresidence with a parent, an indicator variable if the child is married in year t_{a_j}, an indicator variable for whether the child is a head of household in year t_{a_j}, and family income of the child at age a. Again, we run these regressions separately for each year when child j is ages 20, 24, and 28.

Below, we present estimates for two versions of (11) and (12). The first uses OLS, treating all of the explanatory variables in these specifications as exogenous. The second uses two-stage least-squares (2SLS) to account for the endogeneity of parents' and children's contemporaneous income, $Y_{nmt_{a_j}}$, at ages $a = 20, 24, 28$. As instruments, we use the same local housing and labor market variables described in Section 3.2. As reported in Appendix Table B.2, the first stage estimates using these instruments produce very sizable test statistics for their joint significance for both parents' and children's contemporaneous income.

Another obvious issue with the estimation of the parameters in (11) and (12) is the likely endogeneity of $EduFin1$ and $EduFin2$ with respect to parental or children's debt at and after the age of college attendance. It is likely that these measures of college attendance and parental financing may be correlated with unobserved determinants of parents' and children's later-life debt ($u^C_{hjt_{a_j}}$). We attempted to instrument for both variables in the estimation of the debt

equations for both parents and children, using the same set of instrumental variables used for contemporaneous income, but the first stage results for both $EduFin1$ and $EduFin2$ indicated that these were very weak instruments, with the test statistics for the joint significance of these instruments never being greater than 9.8 and most not greater than 5.0. Given these findings, we do not include results below that attempt to instrument for $EduFin1$ and $EduFin2$ in the estimation of the indebtedness specifications. As a result, we consider the resulting estimates for the effects of $EduFin1$ and $EduFin2$ on indebtedness as more descriptive than causal, at least relative to the estimated effects of parental housing wealth and income on their children's college attendance and financing. At the same time, these estimates do illustrate the dynamics of debt within families and the potential consequences for parents of providing financial support to children for college and for the debt burdens of their children after adjusting for a fairly rich set of controls.

4.2 Empirical Results

Panel A of Table 5 shows the results for (11) where the coefficients of $EduFin1$ and $EduFin2$ are expressed relative to $EduFin0$. With respect to parents' mortgage debt, shown in columns (1) and (2) of Panel A of Table 5, both the OLS and the IV estimation results indicate that parents who provide children with a financial transfer for college have more outstanding mortgage debt at each age $a, a = 20, 24, 28$, relative to parents whose children do not attend college. These differences become larger and statistically significant by the time the child is 24 years old. When the child is 24 years old, parents who provide financial transfers to their child to attend college have \$8,920 (\$8,950) more in mortgage debt than parents whose child did not attend college in the OLS (IV) estimates, respectively. In contrast, parents whose children attend college without parental financial support have lower levels of debt at age 20, 24, and

28 than parents whose children do not attend college but these differences are not statistically significant. Recall from Table 4 that the gap in mortgage debt between parents who provide financial support to their child for college and those who do not, narrowed by the time the child was 28 years old. The regression results show that, controlling for demographic and financial characteristics, the gap in mortgage debt between these two group grows over time with parents who provided support having $18,540 and $19,090 more mortgage debt when their child is 28 years old in the OLS and IV specifications, respectively. These differences are statistically significant at ages 24 and 28.

In columns (3) and (4) of Panel A of Table 5, we also see evidence that by the time the child is age 24, parents who provide financial support to their child for college have $4,820 ($5,750) more in non-mortgage other debt than their counterparts whose children did not attend college and these gaps persist until the child reaches age 28. When the child is age 28, non-mortgage debt is $4,340 ($4,800) higher for parents whose children attend college with financial support relative to parents who do not provide financial transfers for college and these differences are statistically significant.

Finally, we examine the regression-adjusted differences in parents' holding of home equity loans in columns (5) and (6) of Panel A of Table 5. Controlling for demographic and financial characteristics, the presence of home equity loans when the child is age 18 does not differ between groups based on college attendance and financing decisions. However, by age 20, parents who provide transfers for college are about 3% more likely to have a home equity loan than parents whose child did not attend college and these differences persist as children age (though are not statistically significant by the time the children are age 28). Differences in the incidence of home equity loans between parents whose children attend college with and without financial

transfers are not statistically significant (Footnote 5 of Table 4) but the patterns across child ages are distinct. The presence of home equity loans declines with the age of the child for parents who do not provide financial support for college whereas it increases sharply when the child is age 20 and remains at this higher level for parents who provide financial support for their child to attend college. Relative to Table 4, the regression-adjusted differentials recorded in Columns (5) and (6) of Table 5 are smaller in magnitude, reflecting underlying differences in the characteristics of parents in these groups.

In Panel B of Table 5 we show results for children's debt at age $a = 20, 24, 28$. Both the OLS and IV results show that children who attend college with or without financial transfers ($EduFin1$ and $EduFin2$) have more student debt and other non-housing debt than children who do not attend college. These gaps in debt between those who attend college and those who do not get larger as children age. By age 28, children who attend college without financial support have \$16,410 (\$16,450) more student debt and \$14,540 (\$14,620) more in general non-housing debt in the OLS (IV) specification, than children who do not attend college. However, the results show that there are no systematic difference in the debt levels of children who attend college with or without parental financing.

4.3 Discussion

While descriptive in nature, two important pieces of evidence emerge from our analysis of parents' and children's indebtedness. First, parents who provide financial support for their children's college educations have more mortgage and other debt than parents whose children do not attend college and than parents who do not provide financial transfers when their children attend college. This additional debt accumulates up to 10 years after these college attendance and initial financing decisions are made. At the same time, parents who do help finance their

child's college education appear to wait until their child has been in college a while – at least until the child is age 20 – before tapping their housing wealth via equity loans.

This delay in the use of housing wealth among parents who help finance their children's college appears consistent with a body of research which highlights that a key role of attending college is to learn about whether one has the ability and preparation to succeed at it. Manski (1989) proposes a model in which attending college is "experimentation," used to learn whether one likes college and has the ability to succeed in college courses. Stange (2012), Stinebrickner and Stinebrickner (2014) and Arcidiacono et al. (2016) develop and estimate learning models for the college attendance and completion decisions based on this idea. And Stinebrickner and Stinebrickner (2012, 2014) provide direct evidence on students' perceptions of their ability to succeed in first-year college courses and the sizable role that disparities in these perceptions with first-year course performance play in whether students drop out or complete college.

While this literature has focused on how these uncertainties and learning that occurs in the first year of college are key elements in students' college completion decisions, they also are likely to be central to parents' decision-making. The extent to which parents are uncertain about their child's likelihood of success may affect how they fund their child's initial attendance versus their continuation in college. While parents may fund their child's initial "trial period" in college out of their income, they may be reluctant to bear the costs (i.e., application fees and interest charges) of taking out loans until they know more about their child's likelihood of succeeding in college. "Learning" that their child is able to make acceptable grades and enjoys college, parents would be more willing to tap their housing wealth, via a home equity loan, to help fund the completion of their child's degree.

Such a model is consistent with our finding that parental income is relatively more important

for funding college attendance but that housing wealth is more important in determining whether the child graduates and with our evidence of delays in the debt accumulation and in the use of home equity loans by parents who help fund their child's college. Unfortunately, the PSID data on mortgages and student performance in college are not detailed enough or collected at a high enough frequency and we do not know the precise timing of parental transfers to estimate whether the above sequence of events holds in the data. But, it is suggestive evidence on how the likelihood of student success in college affects parental financing decisions and is an interesting line for further inquiry.

Our second descriptive finding is that parents' financial support for college does not appear to reduce the levels of student debt that children incur even though parents who provide such support have higher levels of mortgage and non-mortgage debt. One possible explanation for finding similar levels of student debt among children whose parents help finance their college and those whose parents do not is that children in the former group are more likely to graduate and, as a result, may have to pay for more total years of college. This explanation is consistent with the observation that the difference between the debt levels of parents who provide transfers to their child for college and those whose child attends college without parental support are larger at older ages of the child and that parents are more likely to take out a home equity loan after the first year of college.

This second finding also may be the result of how eligibility for students loans is determined. The amount of financial aid, including student loans, is a function of parents' and students' income and financial wealth, but does not depend on parents' or students' housing wealth. In principle, students of parents with higher levels of home equity may be eligible for student loans even as parents use their housing wealth to secure funds via home equity loans.

Unfortunately, the PSID only collected data on the student loans of children in its more recent waves. Thus, we cannot investigate the extent to which this feature of student loan eligibility determination could explain the patterns of parental debt and children's student loan debt for children attending college. Such an analysis may be feasible with other data sources where one has direct information on or can construct student loan eligibility.

Examining the interaction between the debt accumulation of children and their parents is a potentially fruitful area for future research. While there is evidence that student debt affects outcomes for young adults, such as home ownership and cohabitation with parents (Mezza et al., 2020; Dettling and Hsu, 2018) and career choices (Rothstein and Rouse, 2011), less attention has been paid to the consequences for parents of college financing decisions.

5 Conclusion

This paper estimates the influence of parental housing wealth and income on college attendance and financing decisions and on college graduation, explicitly focusing on parental transfers as the mechanism for these relationships. We use an instrumental variables strategy and 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. In contrast, parental wealth increases graduation rates, while parental income does not seem to have an effect on them.

We also examine the ramifications of college attendance and financing decisions on the subsequent indebtedness of parents and children. We find suggestive evidence that the decision to provide financial support for a child's college education increases the levels of parental

mortgage debt but that parents may wait until after their child has completed at least one year of schooling to access home equity loans. Furthermore, 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.

Though our results on children's and parents' indebtedness associated with the latter's college attendance are more descriptive, they do indicate that parents who provide financial transfers to their children take on additional debt that persists well after their children have attended and possibly completed college. It is reasonable to ask about the consequences of such indebtedness for parents' subsequent consumption and well-being. Having parents take on such debt may be an efficient way to fund college to the extent that they have better access to capital markets and more equity to secure loans. Alternatively, such debt may adversely affect parents' later-life consumption and well-being, especially if parents are unable to recoup these returns from their children.[26] Assessing these potential consequences of this form of indebtedness on parents' later live outcomes is a task for future research.

The above findings fill an important gap 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. They complement recent work indicating the increasing importance of parental resources in college attendance and graduation decisions. And they frame new and important questions for future research related to the funding of children's college educations and it consequences for both children and parents.

[26]Brown, Scholz and Seshadri (2012) argue that parents' inability to recoup returns to their children's educational attainment will cause some parents, possibly those who are less altruistic, to not help fund their children's education. Whether this is a key motivation for the 74% of parents in our data (see Table 2) who did not help fund their children's college education is beyond the scope of this paper.

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TABLE 1. Sample Sizes

Samples	N
Parent-Child Pairs for Analyses of:	
Child's College Attendance Choices and Amount of Transfer	2,866
Whether Child Graduated from College[1]	1,418
Parent-Child Pairs when Child at age 24 for Analyses of:	
Parents' Mortgage Debt	2,580
Parents' 'Other' Debt	2,571
Children's 'Other' Debt	1,756
Children's Student Loan Debt	1,196

[1] Sample for college graduation outcome consists of those children who attended college.

TABLE 2. Child's College Enrollment Choices & Parental Transfers for College, College Graduation, Parents' Net Equity, and Income: Home Owning Parents and College-Age Children in PSID, 1997-2015[1]

Variable	Full Sample	$EduFin0$ No College	$EduFin1$ (Coll, but No Transfer)	$EduFin2$ (Coll & Transfer)
College Enrollment & Financing (percent)		44%	30%	26%
Amount of Transfer ($CollTrans$)	\$0.784			\$2.906
Graduated from College ($Grad$) (percent)	27%		37%	43%
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\$.

TABLE 3. Marginal Effects of Changes in Wealth and Income on College and Financing Choices, Amount of Financing and College Graduation[1]

Variable	$EduFin0$ (No Coll) (1)	$EduFin1$ (Coll, but No Transfer) (2)	$EduFin2$ (Coll & Transfer) (3)	Selection-OLS[2] (4)	Selection-IV[3] (5)
Panel A. Schooling and Financing Choice, Multinomial Logit[4]					
$H_{imt_{18_j}}$	−0.0041*	0.0003	0.0037***		
	(0.0021)	(0.0015)	(0.0012)		
$Y_{imt_{18_j}}$	−0.0194***	0.0083**	0.0110***		
	(0.0033)	(0.0029)	(0.0026)		
N		2,652			
Panel B. Schooling and Financing Choice, Control Function[5]					
$H_{imt_{18_j}}$	−0.0037	−0.0001	0.0036*		
	(0.0033)	(0.0031)	(0.0019)		
$Y_{imt_{18_j}}$	−0.0217***	0.0054	0.0163***		
	(0.0046)	(0.0045)	(0.0026)		
N		2,652			
Panel C. Transfer Amounts, Selection-Corrected OLS and IV[6]					
$H_{imt_{18_j}}$				0.0320	0.0135
				(0.0212)	(0.0537)
$Y_{imt_{18_j}}$				0.0919***	0.2043**
				(0.0239)	(0.0871)
R^2				0.478	0.458
N				810	
Panel D. Graduate from College, Selection-Corrected OLS and IV[7]					
$H_{imt_{18_j}}$				0.0007	0.0102**
				(0.0018)	(0.0052)
$Y_{imt_{18_j}}$				0.0040	0.0045
				(0.0024)	(0.0059)
R^2				0.284	0.263
N				1,322	

[1] *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

[2] Regressions are corrected for selection, but $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are treated as exogenous. See Section 3.1 for details. Standard errors clustered by residence's MSA and by state-of-residence if reside in non-metro area.

[3] Regressions are corrected for selection and $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are treated as endogenous. See Sections 3.1 and 3.2 for details. Standard errors are obtained by bootstrap.

[4] Standard errors clustered by residence's MSA and by state-of-residence if reside in non-metro area.

[5] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the control function. See Sections 3.1 and 3.2 for details. Standard errors are obtained by bootstrap.

[6] Regressions use only observations for which $EduFin2 = 1$.

[7] Regressions use only observations for which $EduFin1 = 1$ or $EduFin2 = 1$.

TABLE 4. Parents' & Child's Debt when Child Age 20, 24, 28, by College Attendance and Financing Decisions[1]

Variable	Full Sample	$EduFin0$ (No Coll)	$EduFin1$ (Coll, No Transfer)	$EduFin2$ (Coll & Transfer)
Panel A. Parents' Debt:				
Mortgage Debt Age 20 ($MortBal_{t_{20}}$)	\$6.58	\$4.64	\$5.73	\$9.07
Mortgage Debt Age 24 ($MortBal_{t_{24}}$)	\$6.95	\$4.54	\$5.95	\$10.01
Mortgage Debt Age 28 ($MortBal_{t_{28}}$)	\$6.51	\$4.23	\$5.58	\$9.63
Other Debt Age 20 ($OthDebt_{t_{20}}$)	\$1.17	\$0.75	\$1.43	\$1.31
Other Debt Age 24 ($OthDebt_{t_{24}}$)	\$1.34	\$0.84	\$1.35	\$1.80
Other Debt Age 28 ($OthDebt_{t_{28}}$)	\$1.22	\$1.04	\$1.15	\$1.46
Have Home Equity Loan Age 18 ($Loan_{t_{18}}$)	0.13	0.08	0.13	0.17
Have Home Equity Loan Age 20 ($Loan_{t_{20}}$)	0.14	0.08	0.14	0.18
Have Home Equity Loan Age 24 ($Loan_{t_{24}}$)	0.14	0.08	0.13	0.19
Have Home Equity Loan Age 28 ($Loan_{t_{28}}$)	0.12	0.08	0.13	0.17
Panel B. Child's Debt:				
Other Debt Age 20 ($OthDebt_{t_{20}}$)	\$0.59	\$0.27	\$0.64	\$0.81
Other Debt Age 24 ($OthDebt_{t_{24}}$)	\$1.23	\$0.80	\$1.50	\$1.32
Other Debt Age 28 ($OthDebt_{t_{28}}$)	\$1.57	\$0.48	\$2.04	\$1.93
Student Debt Age 20 ($StudentDebt_{t_{20}}$)	\$0.97	\$0.18	\$1.27	\$1.30
Student Debt Age 24 ($StudentDebt_{t_{24}}$)	\$1.11	\$0.23	\$1.61	\$1.36
Student Debt Age 28 ($StudentDebt_{t_{28}}$)	\$1.47	\$0.24	\$2.10	\$1.84

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

TABLE 5. Effects of Child's College Attendance and Parental Financing on Parents' and Child's Indebtedness when Child is Age 20, 24, and 28[1,5]

Variable	OLS (1)	IV[2] (2)	OLS (3)	IV[2] (4)	OLS (5)	IV[2] (6)
Panel A. Parents' Debt:[3]	*Mortgage Debt*		*Other Debt*		*Home Equity Loan*	
At age = 18:						
Coll, but No Transfer ($EduFin1$)					0.025	0.024
					(0.019)	(0.019)
Coll & Transfer ($EduFin2$)					0.015	0.014
					(0.020)	(0.019)
N					2,369	
At age = 20:						
Coll, but No Transfer ($EduFin1$)	-0.102	-0.099	0.436	0.444	0.023	0.023
	(0.316)	(0.301)	(0.333)	(0.318)	(0.021)	(0.021)
Coll & Transfer ($EduFin2$)	0.504	0.515	-0.059	-0.033	0.034*	0.034*
	(0.385)	(0.363)	(0.223)	(0.207)	(0.020)	(0.020)
N	2,405		2,398		2,407	
At age = 24:						
Coll, but No Transfer ($EduFin1$)	-0.584	-0.582	0.288*	0.284*	0.015	0.013
	(0.435)	(0.436)	(0.166)	(0.158)	(0.013)	(0.013)
Coll & Transfer ($EduFin2$)	0.892**	0.895**	0.482**	0.575***	0.041**	0.038**
	(0.440)	(0.433)	(0.203)	(0.189)	(0.019)	(0.018)
N	2,366		2,364		2,369	
At age = 28:						
Coll, but No Transfer ($EduFin1$)	-0.799	-0.778	-0.035	-0.017	0.013	0.012
	(0.535)	(0.529)	(0.177)	(0.162)	(0.021)	(0.019)
Coll & Transfer ($EduFin2$)	1.055**	1.131**	0.399	0.463**	0.033	0.029
	(0.503)	(0.453)	(0.245)	(0.234)	(0.022)	(0.022)
N	1,686		1,682		1,687	
Panel B. Child's Debt:[4]	*Student Loan Debt*		*Other Debt*			
At age = 20:						
Coll, but No Transfer ($EduFin1$)	0.881***	0.881***	0.400***	0.398***		
	(0.199)	(0.182)	(0.107)	(0.099)		
Coll & Transfer ($EduFin2$)	0.931***	0.930***	0.635***	0.640***		
	(0.149)	(0.136)	(0.127)	(0.117)		
N	1,119		1,356			
At age = 24:						
Coll, but No Transfer ($EduFin1$)	1.497***	1.488***	0.992***	0.991***		
	(0.179)	(0.163)	(0.240)	(0.217)		
Coll & Transfer ($EduFin2$)	1.174***	1.178***	0.773***	0.772***		
	(0.193)	(0.178)	(0.234)	(0.213)		
N	1,191		1,649			
At age = 28:						
Coll, but No Transfer ($EduFin1$)	1.842***	1.877***	1.596***	1.627***		
	(0.287)	(0.256)	(0.234)	(0.212)		
Coll & Transfer ($EduFin2$)	1.641***	1.645***	1.454***	1.462***		
	(0.380)	(0.337)	(0.308)	(0.277)		
N	738		862			

[1] *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All debt amounts are in 10K of 2013$. Standard errors clustered by residence's MSA and by state-of-residence if reside in non-metro area.

[2] Parental income in year t_{24_j} ($Y_{imt_{24,j}}$) for Panel A specifications and child's income in year t_{a_j} ($Y_{jmt_{a,j}}$) for Panel B specifications are treated as endogenous. See Sections 3.2 and 4.1 for descriptions of these instruments.

[3] Separate parental debt regressions are estimated three children ages, $a = 20, 24, 28$.

[4] Separate child debt regressions are estimated three ages, $a = 20, 24, 28$.

[5] The coefficients on $EduFin1$ and $EduFin2$ are significantly different from each other at the 10% level only for the following regressions: Parent Mortgage Debt (OLS) at age 20, 24 and 28; Parent Mortgage Debt (IV) at age 24, and 28; Parent Other Debt (OLS) and Parent Other Debt (IV) at age 28, Children's Other Debt (OLS) and Children's Other Debt (IV) at age 20

Appendix A Descriptive Statistics for Demographic Characteristics of Parents and their Children

TABLE A.1. Characteristics of Homeowning Parents and 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.

Appendix B 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 IV estimators presented in Table 3. 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 B.1. F-Tests of Joint Significance of Instruments in First Stage Regressions in Table 3[1]

Dependent Variable:	$Y_{imt_{18,j}}$	$H_{imt_{18,j}}$	$Y_{imt_{18,j}}$	$H_{imt_{18,j}}$
	Coll. Choice & Financing		*Amt. Transferred*	
F-test	63.95	17.98	25.11	7.28
P-Value	0.000	0.000	0.000	0.001
	Graduate from College[2]			
F-test	59.11	34.88		
P-Value	0.000	0.000		

[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 ($N = 1,322$).

TABLE B.2. F-Tests of Joint Significance of Instruments in First Stage Regressions

Dependent Variable:	$Y_{nmt_{20}}$[1]	$Y_{nmt_{24}}$	$Y_{nmt_{28}}$
First Stage for Results in Panel A of Table 5:[2]			
Parents' Debt at t_{a_j}			
F-test	41.20	28.74	76.00
R^2	0.821	0.785	0.784
N	2,405	2,366	1,686
First Stage for Results in Panel B of Table 5:[3]			
Child's Debt at t_{a_j}			
F-test	258.7	153.0	200.5
R^2	0.861	0.852	0.836
N	1,119	1,171	736

[1] The n subscript in $Y_{nmt_{a_j}}$ is $n = i$ for parents and $n = j$ for child.

[2] The instruments used in the parents' debt regressions and for which the F-tests apply are: $\Delta W^P_{mt_{a_j}}, a = 20, 24, 28$, respectively.

[3] The instruments used in the child's debt regressions and for which the F-tests apply are: $\Delta W^C_{mt_{a_j}}, a = 20, 24, 28$, respectively.

Appendix C Estimates for the Effects of Parental Income and Wealth on the Costs and Quality of Colleges Attended

In this appendix, we examine whether parental wealth and income affect the costs and quality of the college attended for those children who chose to attend college. Below, we outline the data we use to measure college costs and quality, the estimation methodologies used and our findings.

Modeling Children's College & Quality

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 $Private_{ij,18_j}$. Finally, we examine an index of the quality of the college that a child attended by $Quality_{ij,18_j}$. The latter index is only available for children who attended a four-year college or university.

To measure the costs and the quality of the colleges children in our sample attended, 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.[27]

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, Smith and Daniel (2005), Black and

[27] 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.

Smith (2006), Dillon and Smith (2017), and Dillon and Smith (2020).[28] 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.[29] The index is the first principal component of these four indicators of college quality measured in 2008.[30]

In Table C.1, we display mean values for the measures of college attributes described above for those attending college. One can see that all of the measures of college completion and the indicators of the quality of colleges attended are greater for children attending college with parental financial support compared to those attending without it. This is especially true for the composite 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 for those who attended college. Recall that $Attend_{ij}$ is an indicator variable for whether child j attended college and let $Attend4Yr_{ij}$ be an indicator variable equal to 1 for those children who attended attended a 4-year college and zero otherwise. We estimate the parameters of the following regression for regression quality: following form:

$$CollOut_{qij,18_j} = \lambda^O_{q0} + \lambda^O_{q1} H_{imt_{18_j}} + \lambda^O_{q2} Y_{imt_{18_j}} + \boldsymbol{\lambda}^O_{q3} \boldsymbol{X}_{ij_{18_j}} + \lambda^O_{q4} M_{2mt_{18_j}} + \phi^O_{qt_{18_j}} + \delta^O_{qm} + \varepsilon^q_{ij,18_j}, \quad \text{(C.1)}$$

where $CollOut_q = Grad$, $Tuition$, $4YrColl$ are outcomes for those who attend college (i.e., $Attend_{ij} = 1$), $CollOut_q = Private$ and $Quality$ are outcomes for those who attended a 4-year college (i.e., $Attend4Yr_{ij} = 1$), and where $\phi^O_{qt_{18_j}}$ and δ^O_{qm} are year and the parents' county fixed effects, respectively. The vector, $\boldsymbol{X}_{ij_{18_j}} \in \boldsymbol{Z}_{2imt_{18_j}}$, used in (C.1) is the same as the one used in equations (2) and (7), 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

[28] 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.

[29] 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*.

[30] 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.

of data from which college information is obtained (PSID main interview versus Transition to Adulthood).[31]

As with the parental transfers equation in (7) and the specification for whether children attending college graduated in (8), we need to account for potential selection-bias in the estimation of college graduation and measures of college quality, given that these outcomes are only measured for those children who attend college ($Attend_{ij} = 1$) or, the case of quality measures for those who attend 4-year colleges ($Attend4Yr_{ij} = 1$). We use the same two-stage selection-correction estimation strategy described in Section 3. Furthermore, to account for the potential endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ in (C.1), we again employ an IV estimator for (C.1), using the same exclusion restrictions as instruments, i.e., $\boldsymbol{Z}_{1imt_{18_j}} = (\Delta HPI_{mt_{18_j}}, \Delta W^P_{mt_{18_j}})$. The same justification presented in Section 3.2 is applicable to the validity in the estimation of the graduate and quality outcome regressions in (C.1).

Empirical Results

In Panels A and B of Table C.2 we present the estimates of the effects of parental net housing equity ($H_{imt_{18_j}}$) and income ($Y_{imt_{18_j}}$) on various indicators of the quality of the college attended for those children who attended college. OLS estimates are presented in in columns (1) and (3) and IV estimates in columns (2) and (4) for these outcomes outcomes. Looking 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 \$109 based on OLS estimates to \$99 based on the IV estimates. (Recall from Table C.1 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 a private college by 0.3 percentage points

[31] As noted in Section 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 (C.1) 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 $Quality_{ij,18_j}$.

(based on OLS) and would reduce it by 0.46 percentage points (based on the IV estimates). 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 C.2 compared the likelihood of graduation in Panel D of Table 3. The samples used to estimate the effects presented in Panels A and B of Table C.2 are almost half of those used to estimate the effects for college graduation in Panel D of Table 3. (The F-tests for the first-stage of the IV regressions displayed in Table C.3 are all slightly above conventional critical values.) While the smaller sample sizes contributed to the imprecision of our estimates, these findings do not indicate that parents use their income (or housing wealth) to send their child to a more expensive college, a private one, or a more highly ranked one.

TABLE C.1. Measures of the Costs and Quality of Colleges Children Attend by Whether or not Parents Helped to Finance Child's College Education[1]

Variable	Full Sample	Attended College	$EduFin1$ (Coll, but No Transfer)	$EduFin2$ (Coll & Transfer)
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.

TABLE C.2. Effects of Parents' Home Equity and Family Income on Probability of Child Graduating from College and on Quality of College their Children Attended[1]

Variable	Selection-OLS[2] (1)	Selection-IV[3] (2)	Selection-OLS[2] (3)	Selection-IV[3] (4)
Panel A.	*Annual Tuition Costs*[2]		*Attended 4-Year College*[2]	
$H_{imt_{18_j}}$	108.00***	99.40	0.0004	−0.0023
	(52.69)	(80.63)	(0.0020)	(0.0068)
$Y_{imt_{18_j}}$	7.58	−92.63	0.0018	−0.0042
	(63.96)	(67.09)	(0.0027)	(0.0071)
R^2	0.383	0.379	0.368	0.286
N	795		793	
Panel B.	*Attended Private College*[3]		*College Quality Index*[3]	
$H_{imt_{18_j}}$	0.0030	−0.0046	0.0278**	−0.0180
	(0.0031)	(0.0107)	(0.0125)	(0.0299)
$Y_{imt_{18_j}}$	−0.0012	0.0018	0.0128	0.0333
	(0.0110)	(0.0110)	(0.0113)	(0.0356)
R^2	0.301	0.289	0.436	0.316
N	653		643	

[1] *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

[2] Regressions use only observations for children who attended college at age 18 (i.e., $EduFin1 + EduFin2 = 1$) and are corrected for this selection. The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are treated as exogenous. Standard errors are obtained by bootstrap.

[3] Regressions use only observations for children who attended a 4-year college at 18 and are corrected for this selection. The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are treated as endogenous and are instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. Standard errors are obtained by bootstrap.

TABLE C.3. F-Tests of Joint Significance of Instruments in First Stage Regressions in Table C.2[1]

	Annual Tuition Costs[2]		*Attended 4-Year College*[2]	
F-test	43.30	11.68	42.98	11.87
P-Value	0.000	0.000	0.000	0.000
	Attended Private College[3]		*College Quality Index*[3]	
F-test	26.58	12.26	26.36	11.90
P-Value	0.000	0.000	0.000	0.000

[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 ($N = 1,322$).

[3] These regressions are for children who attended a 4-year college at age 18 ($N = 795$).