House Price Growth when Kids are Teenagers: A Path to Higher Intergenerational Achievement?

Daniel Cooper*
Federal Reserve Bank of Boston

María José Luengo-Prado
Northeastern University

September 2011

Abstract

This paper examines whether rising house prices immediately prior to children entering college have an impact on their intergenerational earnings mobility and/or educational outcomes. Higher house prices provide homeowners with additional funding to invest in their children's human capital. The results show that a one percentage point increase in house prices, when children are 17 years old, results in roughly 0.8 percent *higher* annual income for the children of homeowners, and 1.2 percent *lower* annual income for the children of renters. The children who benefit the most from rising house prices are those whose parents are liquidity constrained homeowners.

*The views in this paper are our own and not necessarily those of the Federal Reserve Bank of Boston or the Federal Reserve System. We would like to thank Chris Foote, Olga Gorbachev, and three anonymous referees for their insightful comments, Kevin Todd for helpful research assistance, and Elizabeth Murry for her useful editorial advice.

1 Introduction

The United States has long been a country that promotes homeownership through the mortgage interest deduction, Federal Housing Administration loans, and the non-taxability of imputed rental income. Encouraging homeownership is often viewed as a public policy mechanism for improving economic stability, generating increased community investment, and propelling households to attain more stable living standards. For example, homeowners can use the accumulated equity in their homes as collateral for loans (or lines of credit) to finance home improvements or other needed expenditures. Cooper (2009), Hryshko et al. (2010) and Lovenheim (2011), among others, consider the role of housing wealth as borrowing collateral. Indeed, how fluctuating house values impact consumer behavior has become an important topic for economists, especially given the recent housing boom and bust.

This paper investigates whether house price changes just before children graduate from high school impact their future earnings ability. The idea is that house price appreciation raises owners' housing equity and in turn their ability to borrow against their homes to finance desired expenditures. House price gains immediately before children enter college (teenage year house price growth) potentially increase homeowners' ability to invest in their children's human capital.

Children who start college following a run-up in house prices therefore may have greater educational opportunities than the children of renters or children of homeowners who start college following a period of flat or falling housing prices. With additional parental financing, college students potentially need to work less to help pay for their studies and/or are able to attend a better quality institution—an outcome that is considered by Lovenheim and Reynolds (2010). Better educational opportunities for children often translate into higher lifetime earnings. Rising house prices are likely to be particularly beneficial for the children of homeowners who are otherwise financially constrained.

We analyze whether house price fluctuations when kids are 17-years-old impact their adult earnings by using data from the Panel Study of Income Dynamics (PSID), a dataset

that allows us to track parents and their offspring over time. The PSID includes earnings, education, location, and a wealth of other demographic and financial data for both parents and their children. We also have access to restricted geographic identifiers for the PSID that enable us to use house price growth for the Metropolitan Statistical Area (MSA) in which households lived when their kids were age 17. We can therefore investigate the exogenous impact of house price gains during the teenage years on offsprings' future earnings by holding the intergenerational earnings transmission channel and other factors fixed.

To our knowledge, this paper is the first to examine the link between house price growth during children's teen years and their future earnings and income mobility. We further contribute to the literature by examining fluctuations in house prices as a source of exogenous variation in liquidity for parents (homeowners) looking to invest in their children's human capital. Our dataset also enables us to exploit differences in parents' housing tenure choice and financial resources when considering children's intergenerational income mobility.

Our results show that house price appreciation during children's teenage years has an effect on their future earnings conditional on parental income and other demographic factors. House price growth is beneficial for the children of homeowners but not for the children of renters living in similar locations. In particular, when children are 17-years-old, a one percentage point increase in house prices results in roughly 0.8 percent *higher* average annual income for owners' children (later in life) and 1.2 percent *lower* income for renters' children. Further analysis suggests that house price growth boosted the earnings of children whose parents were homeowners but who had limited non-housing financial resources with which to finance their kids' education beyond high school. If homeowning parents with below median non-housing wealth experience house price growth of one percentage point, their children's annual income is raised by about 1.6 percent in adulthood. This finding is consistent with house price growth during children's teenage years helping liquidity constrained parents to invest in their children's human capital, which in turn opens up greater earning opportunities for these children as adults.

The impact of house price growth on the future adult earnings of children whose parents are homeowners persists even after controlling for the standard channels such as education, marital status, and occupation that are believed to influence lifetime earnings. Our results are generally robust to additional controls and alternative measures of income and house price growth. We also find that the children of liquidity constrained homeowners are more likely to get an undergraduate or higher degree when house prices increase around the time of college matriculation. These children also tend to have lower non-collateralized (student loans, credit card, and other) debt as adults than similar children whose parents did not experience house price growth when their children were 17-years-old. All of these results are consistent with homeowning parents being able to invest more in their children's human capital when house prices rise.

There has been much research on intergenerational (earnings) mobility as well as separate studies that consider the impact that various factors have on educational outcomes. A paper closely related to this one is Boehn and Schlottmann (1999), which examines the relationship between parental homeownership and children's education. The paper finds that the children of homeowners, on average, are more likely to have higher educational achievement than the children of renters. The analysis focuses primarily on parents' housing tenure choice (rent versus own). The authors do not, however, consider whether changing house prices have an impact on kids' achievement beyond their parents' homeownership status, nor do they investigate whether housing has a differential effect for the children of liquidity constrained parents.

Another closely related study is Lovenheim (2011), which looks at how changing house prices during teenage years impact children's college enrollment decisions. The motivation behind this line of research is similar to ours—that is, Lovenheim argues that rising house prices increase homeowners' equity and thus parents have an additional source of funds they can tap to help pay for their children's college education. He finds that after 2000, house price growth raised college attendance among households with limited financial resources. Lovenheim's research, however, does not consider the longer-term impact that house price growth has on children's earnings mobility when they are

adults.

Dynarski (2003) looks at the relationship between parents' financial liquidity and children's college attendance. In particular, she exploits the 1992 rule change that exempted parents' home equity from being considered in financial aid need calculations, which made many students newly eligible for federal college loan programs. Dynarski uses data from the Current Population Survey and the Survey of Income and Program Participation and finds that students eligible for loans are more likely to go to college. There is also a shift among these students toward attending four-year institutions.[1] Brown et al. (2009) also consider the college financial aid market and show theoretically and empirically that parents tend to underinvest in their children's education when there is uncertainty about whether their children will succeed in college.

The related literature also includes Carneiro and Heckman (2002), who find that credit constraints are not sufficient to explain the gaps in college attendance across income groups. Belley and Lochner (2007) look at the effect of cognitive ability and parental income on children's educational attainment and find that credit constraints matter for explaining poorer families' educational attainment. In comparison, Cameron and Taber (2004) provide evidence against credit constraints playing a role in educational attainment. Recent papers that consider the relationship between parental income and children's achievement include Dahl and Lochner (2011), Oreopoulos et al. (2008) and Morris and Duncan (2011). These papers find that parental income plays and important role in determining children's achievement. This literature, however, does not consider the relationship between parental homeownership, house prices and children's achievement.

Finally, there is the early intergenerational earnings mobility research by Solon (1992) and Zimmerman (1992), along with the more recent work by Aughinbaugh (2000). Other

[1]According to the Department of Education, home equity was included in federal need analysis until the Higher Education Amendments of 1992 eliminated home equity from the federal aid calculations beginning in the 1993-94 academic year. Schools are still allowed to incorporate home equity in calculating students' eligibility for *non-federal* financial aid programs, although many eliminated home equity from their private financial aid calculations in the early 2000s. Our results are robust to controlling for the 1992 change in the federal financial aid formulas.

papers that look at different aspects of intergenerational mobility include Charles et al. (2010), Charles and Hurst (2003), Engelhardt and Mayer (1998), Bhattacharya and Mazumder (2007), Hrung (2004), and Hrung (2002). The latter paper studies the relationship between parents' housing wealth and children's consumption.

The remainder of the paper proceeds as follows. Section 2 discusses our empirical approach and Section 3 describes the data. Section 4 presents our results and Section 5 concludes with some suggestions for future work based on this paper's findings.

2 Empirical Approach

This paper bridges aspects of two existing literatures—the intergenerational mobility literature and the educational achievement literature—to consider the impact that changing house prices have on 17-year-olds making decisions about college, and how these choices may affect their future earnings as adults. Our approach is based on the intergenerational mobility literature that estimates, among other things, the correlation between parents' earnings and children's earnings. Solon (1992), Zimmerman (1992) and others estimate intergenerational earnings mobility using econometric variations of the following basic empirical setup:

$$y^{i,c} = \alpha_0 + \alpha_1 y^{i,p} + e_i \,, \tag{1}$$

where $y^{i,c}$ is a child's (log) earnings and $y_t^{i,p}$ is his or her parent's (log) earnings. The constant term, α_0, captures how a generation's average income evolves over time (members of a given generation will typically have incomes higher than their parents). However, the parameter of interest in most studies is α_1, which is the estimate of the intergenerational income elasticity between parents and children. An estimated elasticity close to one means that there is a direct relationship between parent's earnings and children's earnings and that there is no intergenerational mobility. Estimated elasticities closer to zero suggest that children's incomes are not tied to their parents' income, thus indicating

a high degree of intergenerational mobility. Charles and Hurst (2003) examine intergenerational wealth correlations using an approach very similar to equation (1). They also include controls for the age and family size of parents and their children to capture any life-cycle factors that might influence the observed intergenerational relationship as children and parent resources cannot be measured at the same point of the life-cycle in many datasets. We incorporate these controls as well in our analysis.

Our empirical approach considers whether house price gains during children's teenage years impact their earnings beyond the standard intergenerational earnings transmission channel. In a world without frictions, parents should be able to invest optimally in the human capital of their child, and in principle the child should reach his or her full potential based on that investment. In reality, college tuition costs are a large financial burden, and prevent some parents from investing optimally in their offspring's human capital.[2] Changing house prices may therefore impact children's earnings conditional on parental income because rising home values increase housing equity. Such equity can serve as borrowing collateral to finance educational expenses at relatively low costs.

To the extent that parents' housing wealth impacts their ability to invest in their children's education, we would expect that house price growth during children's teenage years will help predict their earnings relative to their parents. In particular, house price increases should result in higher earnings for the children of homeowners—especially those children with potentially liquidity constrained parents. This group includes parents with low levels of non-housing financial wealth and/or those with low current income relative to their future income (high expected income growth). If our house price story holds, then the adult earnings of children whose parents were renters should not necessarily benefit from rising house prices and may even be hurt by housing appreciation. That is, higher house prices typically translate into higher rents, which reduce parents' available financial resources for other expenditures, including their children's education. This situation would result in a negative relationship between house prices and earnings for

[2]See Becker (1962) for a general discussion of human capital investments, and Mulligan (1997) for a discussion of parental investment in their children.

renters' children.

Our baseline specification is a modified version of equation (1):

$$y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,17} + \beta_3 g^{h,17} \times d^{i,p} + e_i \ , \tag{2}$$

where $g^{h,17}$ is real house price growth in the MSA in which the parents and child lived over the two years prior to the child turning 17, and $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise. The remaining variables were defined before.[3] The data, including how we identify parent-child pairs, are discussed in more detail in the next section.

When we estimate equation (2), we split the sample into parents who are either owners or renters since renters do not necessarily benefit from house price increases.[4] All else equal, the impact of house prices on children's earnings, β_2, should be positive for the children of owners and zero or negative for the children of renters. If our conjecture regarding financially constrained parents is valid, house price growth should have a differentially larger effect on kids' earnings when homeowners are liquidity constrained, $\beta_3 > 0$. As part of our robustness checks we also include additional parental and demographic controls to check that house price growth is not simply picking up other socioeconomic factors that might impact children's earnings relative to their parents' earnings.

There are two additional margins on which homeowners' children might benefit if house price growth influences their educational attainment. First, we would expect the number of college graduates to increase with house price appreciation and the number of children who achieve less than a college education to fall. With additional household resources, more children should have the financial means to complete college. In addition, the children of parents that finance more of their college education through home-equity borrowing should, all else equal, have less non-collateralized debt holdings as adults. Less

[3]MSA-level house price data come from the Federal Home Finance Agency (formerly OFHEO).

[4]We split the sample rather than include an interaction term for homeownership in order to allow all the parameters to vary freely based on households' housing tenure choice. We are primarily interested in the effect of tenure choice on the relationship between house price and children's earnings, however, nothing suggests that tenure choice should not also impact the estimated intergenerational income elasticity. Our results are also easier to interpret when splitting the sample.

debt is a result of these children potentially taking out fewer college loans themselves to pay for their education.[5] We analyze these outcomes as a further test of our claims about the relationship between house price growth and children's future earnings when adults.

3 The Data

We use data from the PSID which in 1968 started interviewing about $4,800$ households. Sixty percent of the initial households belong to a cross-national sample from the 48 contiguous states, while the other portion is a national sample of low-income families from the Survey of Economic Opportunity. The PSID conducts annual interviews (biennial since 1997), thereby creating a panel dataset with extensive socioeconomic information. What makes this dataset very useful for studying intergenerational linkages in the United States is that over time the PSID follows the original households and the households started by their offspring.

To construct our matched sample of parents and children, we proceed as follows. We start in 2007, the latest year for which family income data is available, and keep individuals aged 25–65 years who are heads of households—we refer to these individuals as children although they are adults when we collect their income information.[6] The PSID contains identifiers to link children with their parents (we link a child to his/her father and if not possible to his/her mother). There is also data on children's birth year, so we can compile data on family or parental variables around the time their children were 17-years-old assuming they still lived at home (more details below). We keep respondents from both the representative sample and the low-income sample since our focus is on the effect of credit constraints on human capital investment, and credit constraints could affect low-income families to a greater extent.

The PSID maintains Geocode Match Files that contain the identifiers necessary to

[5]College loans, like credit cards, are classified as non-collateralized debt because this borrowing is unsecured.

[6]When studying intergenerational income correlations, it is standard to restrict the sample to individuals who are below the typical retirement age, and who are most likely to have completed their education. We employ the same age restrictions for parents.

link the main PSID data to other datasets with information on the characteristics of respondents' neighborhoods, cities, or states.[7] In our case, we identify the MSA children lived in during the year they turned 17 and add in the relevant MSA house price appreciation data at that time from the Federal Housing Finance Agency (FHFA). We focus on MSA house price appreciation because it arguably provides exogenous shocks to homeowners' wealth and borrowing collateral as opposed to self-reported house price appreciation that might be contaminated by homeowners' improvements to the property and other factors. Since MSA house price indices from FHFA start in the late 1970s our final sample contains 913 "child" respondents who turned 17-years-old between 1979 and 1999 (the median year is 1990, and the respondents are 25–45-years-old in 2007), and live in 126 different MSAs.[8] There is great variation in house price growth in our sample: the two-year mean real growth is 2 percent, with a 9 percent standard deviation. The maximum price decline over a two-year period is 28 percent and occurs in the Eugene-Springfield MSA in 1981, while the maximum appreciation, 39 percent, took place in the Boston MSA in 1986.[9]

Along with several socioeconomic variables for children from the 2007 survey, we collect parental and family variables around the time the child was 17-years-old. Table 1 presents weighted summary statistics using the PSID family (household) weights. Parental age when children are age 17 ranges from 32–65 years (the median age is 44), so they are on average older than the children we observe as heads of households in 2007 who range in age from 25–45 years (the median age is 33). The median family size for the parents is four, while it is three for their children. When calculating intergenerational income elasticities, we control for these differences by including a third-degree polynomial for children's and parent's ages as well as a second-degree polynomial for parent's

[7]The Geocode Match data are highly sensitive (usually pinpointing the census tract in which families live), and are available only under special contractual conditions designed to protect the anonymity of respondents.

[8]We would like to include children who turned 17-years-old before 1979 or after 1999. Our estimation setup and the availability of MSA house price data (1975 through 2011), however, prevent the inclusion of additional children in our sample.

[9]We use the all-item-less-housing CPI to deflate house prices.

and children's family sizes. A smaller share of children (53 percent) are homeowners compared to their parents (77 percent) due to the fact that children are on average ten years younger when we observe their resources. In addition, 18 percent of the heads of households in the parental generation are black, 86 percent are male, 24 percent have a bachelor's degree or higher, and the average number of completed years of schooling is 13.71.[10] In comparison, 17 percent of children are black, 50 percent are married, 40 percent have at least a college degree, and on average they have 13.69 years of completed education. Since in some instances we restrict the sample to children whose parents were homeowners when they were 17-years-old, appendix Table A-1 presents summary statistics for this sub-sample of roughly 590 children. Overall, the demographic variables are similar between the two samples, although the individual members comprising the owners' sample not surprisingly have, on average, higher income, wealth, and years of schooling.

In our benchmark regressions, we start by computing an intergenerational family income elasticity. Family income in the PSID is the sum of head of household (and spouse) taxable income (earnings, asset income, net profit and business income), head of household (and spouse) transfer income, head of household (and spouse) social security income, plus taxable income, transfer income and social security income from other family members.[11] We follow Solon (1992) and Zimmerman (1992) by averaging parental family income over a five-year period centered around the year their child turns 17 to alleviate the downward bias from measurement error pointed out in the intergenerational mobility literature.[12] For children, we average family income for the survey years 2005 and 2007.[13]

[10]In the PSID, the head of household is preferably the adult male living in the residence. In addition, heads of households who are black include those individuals who identify as bi-racial. As a result, the percent black in our sample is slightly higher than in aggregate U.S. population statistics.

[11]We also use head (and spouse) labor income or just head labor income as a robustness check and the results were qualitatively similar.

[12]For example, for a child who turns 17 in 1988, we use parental income for 1986 to 1990. Note however, that for younger children, the number of observations used to calculate average family income may be as low as three because the PSID becomes biennial after 1997.

[13]We make sure children are heads in both 2005 and 2007, but include those children with only one year of available income data (not averaging in this case). Measurement error is a less important issue when the variable is on the left-hand side, and the results are similar if we only use children's 2007 income.

Average parental family income is roughly $63,000, and is about $10,000 higher than children's average family income.[14] This difference is explained by the fact that parents are on average older than the sample of children when we measure their resources.

We identify children with possibly liquidity constrained parents in different ways. First, we consider parents' non-housing wealth (wealth excluding home equity) using data from the PSID wealth supplements. The PSID started collecting wealth data in 1984 at five-year intervals up to 1999 and biennially afterwards. We use the parental (non-housing) wealth observation closest to, and if possible before, the year the child turns 17.[15] Mean non-housing wealth is approximately $171,000 (median non-housing wealth is $45,000). Second, we construct a measure of liquid wealth as the sum of balances in stocks, bonds, and cash-related accounts using additional information from the wealth supplements. Mean parental liquid wealth is roughly $49,000 in our sample, while median liquid wealth is about $4,000.[16] Third, to avoid possible measurement error problems arising from the infrequency of the wealth supplements, we consider an alternative wealth measure constructed from regularly collected data on households' asset income (dividends, interest, and rental income).[17] We use the value of households' asset income in the year their child turns 17—mean asset income is around $1,300 while the median is zero. Parents with higher asset income likely have higher wealth holdings, and Table 2 shows that indeed the various wealth measures are moderately correlated. In addition, we identify parents with low current income relative to future income by calculating four-year (annualized) family income growth beginning in the year the child turns 17. Parents

[14]Values are in constant 2000 dollars. Parental family income might appear high, but it is a five-year average so transitory variations are attenuated. Average income is also calculated close to the income peak over the life-cycle for most parents.

[15]We prefer to use parental wealth before the child turns 17 as non-housing wealth may appear low when using a forward observation if parents have already paid for college with non-housing related assets. For kids who turn 17 before 1984 (about 18 percent of the sample), using prior wealth data for their parents is not possible, so we use these parents' 1984 wealth information instead. Our results are similar when we omit these parent/child pairs from our sample.

[16]The number of observations is lower for this variable than for the non-housing wealth measure because the PSID imputes missing observations for comprehensive wealth measures using additional information from the regular family surveys, but it does not do the same for the individual wealth components.

[17]The exact variable definitions vary over the survey years, but we construct as consistent a measure of asset income as possible.

with low current income relative to future income may also be liquidity constrained in the sense they might want and/or need to borrow to smooth their expenditures over time. This measure of potential liquidity constraints also relies on data from the regular PSID surveys as opposed to the wealth supplements. Average parental income growth is 3 percent with a 13 percent standard deviation. In the case of non-housing wealth, liquid wealth, and asset income, we classify a family as liquidity constrained if its holdings are at or below the median of the variable in question. When using income growth, we say the family is potentially liquidity constrained if income growth is above or at the median. The first three measures of liquidity constraints are positively correlated as shown in Table 2, while the latter measure seems to capture a different set of households (we discuss this further in Section 4).

As explained in Section 2, we interact the liquidity constraint dummy variables with (real) house price growth in the MSA where children lived at age 17 to examine the differential effect of house price growth on children's earnings for potentially financially constrained versus unconstrained families. We use two-year house price growth in our analysis of equation (2) as a benchmark but also discuss results for house price growth measured at different frequencies.

4 House Prices and Children's Income

We start our analysis by estimating an intergenerational (family) income elasticity. In particular, we regress the logarithm of children's income on the logarithm of parental income (averaged over a five-year period) as described in equation (1).[18] Since we observe parents and children at different stages of their life-cycles, we include age and family size controls for both parents and children. The estimated elasticity, column (1) of Table 4, is 0.43, which is within the range of previous studies.[19] In the next specification,

[18]The estimates allow for heteroscedasticity of an unknown form.

[19]For example, Mulligan (1997) estimates an intergenerational income elasticity of 0.43. Mazumder (2005), using U.S. Social Security Administration data, finds an elasticity of 0.47 when using six years of fathers average earnings, and an elasticity of 0.65 when using an average of fathers' earnings over 15 years.

we include controls for the state children lived in at age 17 and dummies for children's (five-year) birth cohorts. These controls are not necessarily standard in the intergenerational mobility literature, and are introduced to aid in our interpretation of the estimates which include house price growth. Our hypothesis is that house prices affect kid's income conditional on parental income because rising home values create additional education financing opportunities for homeowners who have children. The constraints faced by residents of states with good-quality, state-run higher education with relatively low tuition, however, might be different from the constraints faced by residents of other states. Including birth cohorts accounts for the fact that home-equity extraction may have become easier over time given that our sample includes children who were 17-years-old between 1979 and 1999. With these additional controls, the estimated income elasticity, is just slightly lower, 0.402, than without them—column (2).

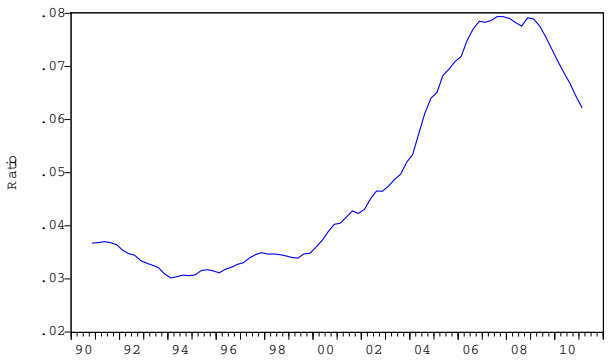
We want to stress that the sample covers a period of substantial home equity borrowing despite ending prior to the housing boom. Households' use of home equity borrowing to finance expenditures received much press (and use) during the 2000s house price boom, but such borrowing has been prominent since the elimination of Regulation Q in the early 1980s, and the ensuing liberalization of the credit markets.[20] Home-equity borrowing became a particularly attractive form of financing with the 1986 Tax Reform Act that eliminated the interest deduction for non-collateralized (credit card) borrowing and made the interest on primary mortgages and up to $100,000 of home-equity borrowing tax deductible. Banks also began publicizing homeowners ability to borrow against their housing equity in the early 1980s and the amount of home equity debt outstanding jumped from $1 billion in 1982 to $100 billion in 1988.[21] In addition, home equity debt outstanding was roughly 4 percent of GDP during the early 1990s, as shown in Figure 1,

[20]Regulation Q limited the interest rates banks were able to pay on deposits and forbade them from paying interest on checking account balances. See Gerardi et al. (2010) for a further discussion of Regulation Q and its effect on limiting household credit. We unfortunately cannot test the impact of this policy change on households' use of home equity borrowing for investing in their children's education because of data availability.

[21]http://www.nytimes.com/2008/08/15/business/15sell.html?_r=1&hp=&adxnnl=1&oref=slogin&pagewanted=all&adxnnlx=1315512301-HZZSBoCsUl9ZZA3evzVbRg accessed September 8, 2011.

and while this was well below the peak of 8 percent during the 2000s it suggests that households borrowed a substantial amount of money against their homes well before the housing boom in the early 2000s.[22]

FIGURE 1: Home Equity Debt Relative to Income



Source: Authors' calculations based on NIPA data (GDP) and Flow of Funds data (home equity debt).

In column (3), we include the two-year (real) house price appreciation (measured in percents) in the MSA where the children lived at age 17. The estimated coefficient is positive, but it is not precisely estimated. Since we expect a differential effect for owners and renters, we split our sample accordingly. Columns (4) and (5) present the results for renters and owners, respectively. The intergenerational elasticity for renters, 0.24, is significantly lower than the estimated elasticity for owners.[23] This finding may just reflect the fact that homeowners tend to have higher incomes than do renters.

Our goal, however, is not to explain the different income elasticities between owners and renters but rather to study the effect that house price growth has on children's income. We further find that house price growth at age 17 decreases adult income for renters' children and increases adult income for owners' children. According to our estimates, a one percentage point increase in housing appreciation results in 1.2 percent lower (annual) income for renters' children and 0.8 percent higher income for owners'

[22]We unfortunately cannot explore if the effect of house price appreciation on children's earnings has become stronger over time because our sample is small and the children in the more recent parent-child pairs are too young to reach meaningful conclusions.

[23]The p-value for a χ^2-test of equality of both elasticities is 0.013.

children. This translates to roughly $364 of additional earnings for owners' children and $354 less income for renters children based on the median earnings for the two groups.[24] These findings are consistent with the expectation that the children of homeowners benefit from their parents' higher housing wealth and collateral, and the children of renters are hurt by the higher rents that come with housing appreciation. We rule out that the difference between renters and owners is due to renters living in bad MSAs versus good MSAs (based on house prices and/or economic conditions) since as documented in in Table 3 there are no substantial differences in MSA level house prices, income growth or unemployment rates across the two groups. The impact of fluctuating house prices on children's earnings is economically significant within the group of homeowners. Other things equal, the child of a homeowner in the 75th percentile of house price growth (growth around 6 percent) is predicted to have about 6.6 percent higher income than the child of a homeowner in the 25th percentile of house price growth (growth about –2.5 percent).

If financial constraints are important for the acquisition of higher education, we would expect house price growth for homeowners to have a larger effect on kids' income when parents are liquidity constrained. Thus, we estimate equation (2), which allows for an interaction of house price growth and a dummy for (possibly) liquidity constrained parents. As discussed in Section 3, we identify liquidity constrained families in different ways: families with below median non-housing wealth, liquid wealth, or asset income, and families with above median future income growth. Columns (6) to (9) tell a very consistent story. The effect of house prices on income for homeowners seems to operate mainly through constrained families: a one percentage point increase in house price growth results in 1.2 to 1.6 percent higher annual income for the children of financially constrained parents.[25] The median income for the children of low-wealth parents is about $34,000, so 10 percent house price appreciation when these kids are 17-years-old

[24]Median income for owner's children is $45,471 and $29,534 for renter's children. The calculation assumes that house prices appreciate one percentage point and then applies the estimated effect for renters and owners to the relevant income measure.

[25]The p-values for F-tests for the equality of β_2 and β_3 are 0.03, 0.10, 0.04, and 0.01 in columns (6)–(9), respectively.

would raise their future earnings by about $5,466. This finding suggests that house price growth during kids' teenage years has an economically meaningful impact on their future earnings. The implied earnings effect is essentially the same based on the alternative estimates of liquidity constraints in columns (7) to (9). Since our results are similar for the different measures of liquidity constraints, we primarily focus on the first measure, below median non-housing wealth, in the rest of our analysis. Although in the interest of brevity the results are not reported, we do not find significant differences in the effect of house price growth for potentially constrained versus unconstrained renters. Going forward we will focus on the outcomes for homeowner's children.

Robustness

We check that our results are robust to controlling for local economic condition where households live when their children are 17-years-old. These controls include two-year per-capita MSA income growth (over the same time horizon as house price growth), and the MSA unemployment rate in the year kids have their 17th birthdays. Our findings are indeed robust to these additional controls when they are included separately and together in our baseline estimates, which suggests that house price growth is not simply proxying for local economic conditions (see Table A-2 in the appendix for additional details). Our results are also robust to clustering the standard errors at the MSA or state level as shown in appendix Table A-3. Since there may be more than one child per household we also cluster our estimates at the household (parent) level. This approach also has little impact on the precision of our findings and we use standard White (1980) heteroscedasticity robust standard errors going forward.

Table 5 presents some robustness results where relative to the baseline specification we alter the definition of house price growth and introduce some additional controls. These estimates should be compared to columns (5) and (6) in Table 4. In columns (1) and (2), we use a dummy variable for house price growth instead of the continuous variable in the baseline regressions—the dummy takes the value of 1 if two-year house price growth is positive and is 0 otherwise. According to our results, a child's income is roughly

15 percent higher in adulthood if housing appreciated in the MSA where he/she lived at age 17. We do not find a differential effect between constrained and unconstrained families when using the dummy variable for house price growth, possibly because the variation in house prices is limited. Columns (3) and (4) use a measure of relative house price changes—MSA house price growth relative to the national average. Our estimates indicate that one percentage point housing appreciation above the national average is associated with roughly 1.1 percent higher income for kids. In this case, the estimated house price effect for constrained families, column (4), is much larger than the overall effect but not statistically different.

In the remaining columns of the table we revert to our original two-year continuous measure of house price growth. In columns (5) and (6) we add a quadratic house price growth term to determine whether the interaction between house price changes and the constrained family indicator is simply picking up some nonlinearity in house price growth. The results suggest that this is not the case. The effect of house price growth on children's earnings is still much larger in magnitude for children with liquidity constrained parents. The estimated coefficients change enough, however, that the p-value for the test of equality between constrained and unconstrained families is 0.22. To ensure that we are not picking up the effect of the families living in areas with more valuable housing stock and hence with potentially higher quality schools, in columns (7) and (8) we include the logarithm of parents' house value when their child was 17-years-old. Parents' house values have a substantial and precisely estimated impact on children's earnings when adults, but the effect of house price growth persists along with the observed differences between constrained and unconstrained households. Lastly, in columns (9) and (10) we add controls for the year in which the child turned 17 instead of the five-year cohort dummies to make sure our results are not simply capturing good or bad economic events occurring at the time a child is 17-years-old. The results are, once again, qualitatively unchanged.

Table 6 considers alternative timing for measuring house price growth during children's adolescent years. Recall that our baseline specifications use two-year MSA house

price growth at the time children are age 17. The results in columns (1) and (2) in the table use one-year house price growth instead. The overall effect of housing appreciation on children's earnings is similar to the baseline case. In particular, a one percentage point increase in house price growth during kids' teenage years leads to 1.3 percent higher income when they are adults. The income effect for the children of financially constrained parents who are homeowners continues to be differentially large; a one percentage point increase in house prices leads to roughly 3.7 percent higher annual income or about $1,250 evaluated at these children's median average earnings.[26] This result suggests that recent house price changes have a particularly large impact on the borrowing and spending ability of households with limited other financial resources. There also continues to be an economically meaningful effect of fluctuating house prices on children's adult earnings within the group of homeowners. For a homeowner in the 75th percentile of house price growth (growth around 3.1 percent), his or her child is predicted to have about 5.7 percentage points higher annual income than the child of a homeowner in the 25th percentile of house price growth (growth about –1.4 percent), all else equal.

The next two columns of Table 6 use expected income growth as the measure of parents' borrowing needs rather than their financial (non-housing) wealth. House price growth during their offspring's teen years continues to have a noticeable impact on these children's adult income. The effect of housing appreciation on children's earnings is larger for the children of constrained parents but is not precisely estimated. The remaining columns in Table 6 use house price growth measured over a *longer* time horizon. In particular, columns (5) to (8) incorporate four-year house price growth and columns (9) to (12) look at cumulative housing appreciation since parents purchased their current home.[27] Housing appreciation over a longer period is arguably a better indicator of parents' total equity available for use as borrowing collateral. The results continue to show that house price growth has a positive impact on children's earnings. The main

[26]If we annualize the baseline two-year house price growth, then the equivalent estimated income effects are 1.5 percent and 3.3 percent, respectively.

[27]If house price indices were not available for the entire tenure period, the cumulative house price growth refers to the longest time period for which it can be calculated.

difference between these longer horizon house price growth results and the baseline ones is that housing appreciation only has a differential impact on children's income when parents' borrowing needs are measured by their expected income growth.

The fact that short-term house price fluctuations matter more for children with low-wealth parents while longer-term housing appreciation impacts children whose parents experience high future income growth suggests that we are identifying households that are constrained in different ways. Low-wealth households are more likely to consume most of their earnings and may have recently borrowed against their home to finance other expenditures. As a result, changes in low-wealth parents' housing equity immediately around the time their child enters college potentially determines whether these households can borrow against their home to finance their children's education. In contrast, high income growth households may be experiencing a temporary drop in their income relative to normal requiring them to borrow to help finance the major expense that is their children's education, but they normally have sufficient resources to fund their expenditures. For these households, who potentially have not had to borrow in the past, it makes sense that their accumulated housing equity over time is what determines their ability to borrow to finance their children's college expenses.

Overall, the impact of house price growth during their teen years on children's future income is robust to additional controls and alternative data measurement. As in our baseline estimates, higher house price growth is associated with higher income later in life for the children of homeowners. However, in some cases we cannot reject the equality of the house price growth effect at conventional levels for financially constrained versus unconstrained families even though the effect remains quantitatively much larger for families who are potentially constrained absent their housing equity. The differential effect of house price growth for the adult income of children whose parents are liquidity constrained persists when we focus on the variation in house prices that most likely matters for these households (short-term, non-relative appreciation).

Finally, we want to point out that although we describe our findings in terms of housing appreciation increasing children's earnings, the reverse is also true—housing

depreciation is associated with lower earnings for the children of homeowners who experience house price declines around the time their offspring graduate from high school. In particular, Table A-4 in the appendix shows little evidence of children's income as adults responding differently to positive versus negative changes in house prices (we cannot reject the equality of the coefficients on house prices at conventional levels). We therefore focus our attention on the impact of overall house price changes.

Falsification

If our story holds and rising house prices when children are 17 improve liquidity constrained parents' ability to send their kids to college and/or send them to a better (more expensive) institution, then house prices during later years should have little or no impact on children's earnings as adult. Table 7 shows our baseline estimates where house price growth when children are age 17 has been replaced by house price growth when they are age 21. By age 21, most children are well into if not nearing the end of their post-secondary education and further changes in parents' housing equity should have much less of impact on children's educational opportunities and attainment.[28]

The results in Table 7 show that there is still an overall positive relationship between house price growth and children's income as adults, but the estimated effects are smaller than in the baseline case and are very imprecisely estimated. Most of the findings are statistically indistinguishable from house prices having no effect on children's earnings as adults. House price growth at age 21 has a somewhat larger impact on the earnings of children with liquidity constrained parents, but again these estimates are quite imprecise. The continued positive and larger house price effect for constrained parents could indicate that for a few households, house price growth even toward the end of kids' college years matters in terms of their ability to finish school and focus on working hard and not finding ways to work to pay their tuition. Table A-5 in the appendix shows that the different results in Table 7 relative to our baseline results are not due to the sample

[28]Housing equity changes at age 21 could matter to the extent parents help finance children's graduate studies. The percentage of children that go on to graduate studies, however, is small and parental support for their children's graduate studies is much less prevalent.

being somewhat smaller than that in our benchmark specification of Table 4 . That is, our baseline results hold, as shown in Table A-5, when we re-estimate them over the sample of households from Table 7.

Channels

Table 8 also focuses on homeowners and considers the relationship between various explanatory channels for earnings differences across individuals and the differential impact that house prices have on the earnings of children whose parents are liquidity constrained. To the extent these potential channels are positively correlated with house price growth or parental income, we would expect the estimated relationship between these variables and children's earnings to decline.[29] Any remaining correlation between house prices and children's adult earnings suggests that house price changes matter for children's earnings beyond the channels considered. This analytical approach is similar to that used in Charles and Hurst (2003) who investigate the factors that might explain intergenerational wealth correlations.

The channels we consider in Table 8 include the child's occupation and industry, the MSA in which the child currently lives, his or her educational attainment, and his/or her marital status.[30] Wages are often heavily tied to one's industry and occupation as well as education, while differences in geographic locations may account for better (or worse) job opportunities or differences in income caused by compensating living differentials. In addition, marital status is a potential indicator of family stability and/or the need to maintain a good job to provide for others, as well as an indicator for potentially more earners in the family. Column (2) adds the education controls, column (3) adds marital status and column (4) adds industry and occupation dummies, while the final column (5) considers all the potential channels together.

Our baseline results—reproduced in column (1)—show that house price growth prin-

[29]Technically speaking, the estimated relationship could rise if one of the additional controls is positively (negatively) correlated with house price growth or parental income, but has a negative (positive) independent effect on children's earnings.

[30]The standard baseline controls are also included.

cipally affects the income of children whose parents had below median liquid wealth during their teenage years. This interaction effect is nearly eliminated after controlling for all of the considered channels, column (5). At the same time the direct effect of house price growth on children's earnings increases noticeably. This finding is consistent with increased housing equity helping liquidity constrained parents finance their children's education. With an additional funding source, children complete college and/or otherwise achieve a higher level of education than they would have in the absence of the house price appreciation. Attending college and/or obtaining a better education improves these children's earnings potential. That is, increased schooling allows them to live in better locations and/or work in better jobs than would have been possible otherwise. Therefore, after controlling for the additional opportunities afforded to college graduates, children's future earnings no longer depend on whether their parents were liquidity constrained homeowners or not at the time they were finishing high school. In other words, these controls capture the channels through which liquidity constraints impact future adult incomes, and house price growth for liquidity constrained parents no longer explains their children's future earnings.

Notice as well that the direct effect of housing appreciation on children's earnings gets larger when the additional explanatory variables are taken into account. This robust result suggests that house prices during children's teens still have a direct effect on their adult income for reasons other than the standard channels controlled for in Table 8 and/or through house prices relaxing households' liquidity constraints. House price appreciation may not only allow children to attend college who otherwise would not, but also may permit some children to attend better quality institutions than they otherwise would have.[31] An additional benefit of children receiving more college financing from their parents is that they can likely devote more time to studying rather than working to help pay for their education. Alternatively, children may be better positioned to accept unpaid internships that serve as a stepping-stone to improved future employment and/or have more time to search for a quality spouse if their parents provide them with additional

[31]See Lovenheim and Reynolds (2010) for a study on house price growth and college choice.

resources during college. All of these opportunities could result in higher future earnings when the child reaches full adulthood. Unfortunately, the PSID data do not allow us to explore these channels further.

Direct Exploration of Children's Other Outcomes

We also consider the direct effect that house price growth has on educational attainment for the children of homeowners. In particular, children are classified into three broad educational categories—high school graduate or less, some college, and BA-BS degree or higher. We then investigate whether housing appreciation can predict college attendance (some college) and college completion (BA-BS degree or higher) using simple probit specifications. To facilitate the interpretation, we first use the two-year house price appreciation dummy from the previous section as a measure of house price growth, and then use the continuous variable second. Other explanatory variables include family income at age 17 and two measures of family wealth: a dummy for having below median non-housing wealth and parents' self-reported home value when their child was 17 (higher local property values tend to be associated with better primary and secondary schools). We also interact house price appreciation with low wealth to mimic our previous specifications. We include as additional controls a dummy for the household head having completed college, gender, race, the unemployment rate in the MSA where the child lived at age 17, cohort dummies, and state dummies for the child's residency when 17-years-old. Table 9 reports marginal effects for the relevant explanatory variables on children's educational attainment evaluated at the mean of all the other independent variables.[32]

The results using the house price growth dummy variable are shown in columns (1)–(3). Higher parental income and wealth are associated with a higher probability of college completion and a lower probability of not continuing formal education beyond high school. The children of college graduates are also more likely to be college graduates themselves.

[32]The number of observations is slightly lower than in our previous specifications because unemployment rates are not available for all MSAs.

The MSA unemployment rate is also a significant predictor of college completion, perhaps suggesting that students stick with their college education longer when their outside (employment) options are limited. Focusing on our variable of interest, children are 12.7 percent more likely to have completed some college if their 17th birthday occurred during a period of house price appreciation. Also, although children from low-wealth households are about 22.4 percent less likely to have a college degree than children from high-wealth households, they are about 27.5 percent more likely to obtain a college degree when house prices are appreciating. In other words, the children of low-wealth parents are about as likely as the children of high-wealth parents to graduate from college when house values appreciate. These findings are further consistent with house price growth helping parents to invest more in their children's human capital. The results in Table 9, columns (4)–(6), using the continuous measure of house price growth are qualitatively consistent with the results using the dummy variable for house price growth. The only difference is that the direct effect of house price growth on college graduation is negative and *precisely* estimated. The direct effect is negative in column (3) as well but with a larger standard error. This finding could be the result of housing prices being positively correlated with unobserved outside options for children (instead of college) that are not well-captured by the unemployment rate variable alone.

We also explore whether house price growth during children's teen years affected their financial liabilities as of 2007 to determine if housing appreciation for homeowners is associated with lower debt levels for young adults who are college graduates. In particular, we focus on a variable the PSID labels "other debt" that records households' non-collateralized debt such as "credit card charges, student loans, medical or legal bills, or loans from relatives."[33] Table 10 summarizes the results. Children who attend college have higher non-collateralized debt on average as adults, which is consistent with students' common need to take out unsecured loans to finance their higher education. Since many of these loans can be repaid over a 30-year period after college graduation, it makes sense that those individuals who attended college would have greater unsecured debt even

[33]Information on student loans separate from other non-collateralized debt is not available from PSID.

as adults. Debt is lower for college attendees, however, if house prices appreciated in the year they turned 17. This finding suggests that when house prices rise, financing sources other than student loans were available to pay for children's education—a result that is consistent with our claim that rising house prices allow parents to invest more in their children's human capital. Overall, the results in Table 9 and Table 10 show that house price growth is associated with higher educational attainment for the children of homeowners and less debt for those children who are college graduates.

More on Mobility

In the intergenerational mobility literature, it is standard to report transition matrices that are simple cross-tabulations of parents' and children's economic status after their status has been ranked into a finite number of groups. The elements of a transition matrix measure the probability of a child's economic position conditional on his/her parent's position. To further explore the role of house prices on income mobility we construct transition matrices as well. Since our sample size is small, we divide parents and children into the quartiles of their respective income distributions. Given that in our data parents and children are observed at different stages of the life-cycle, we first regress log family income on second-degree polynomials for age and family size (separately for parents and children) and classify children and parents into four quartiles based on the residuals from these regressions.[34] The results are reported in Table 11 (for homeowners) and Table 12 (for renters).

The diagonal elements in a given matrix measure the probability of a child being in the same income quartile as his/her parent(s). Interpreting the off-diagonal elements of the matrices is similar. For example, the second entry in the first row of a given matrix tells us the probability of a child being in the second quartile of the income distribution conditional on his/her parent being in the bottom quartile. The fourth row of the first column reports the probability of a child ending up in the bottom income quartile conditional on his/her parents being at the top of the income distribution and

[34]The quartiles are calculated using the PSID family weights.

so on. The standard errors for these conditional probabilities are shown in parentheses.[35]

Since we are interested in the effect of house price growth on intergenerational mobility, we report transition matrices after splitting the sample into two groups based on whether house price growth was above or below the national average when the children were 17-years-old. We use relative house prices because the cross-tabulations do not control for state of residence or cohort effects. The top panel in Table 11 shows the transition matrix for the full sample of homeowners, the middle panel shows parent/child pairs with house price growth above the national average, and the bottom panel shows households with below average house price growth.

As extensively documented, the persistence of economic status is greatest for the top and the bottom income quartiles. Our full sample results are consistent with this pattern. Children with parents in the first income quartile have a 43 percent probability of being in the first income quartile themselves. Similarly, children with parents in the top income quartile have a 38 percent probability of being in the top income quartile themselves. The probability of children remaining in the second or third quartiles is lower, 24 percent and 35 percent respectively. Examining the split between households that experience favorable versus unfavorable house price changes yields some interesting results. In particular, the probability of children ending up in the highest income quartile is lower for all parent income quartiles when house price growth in the MSA the child was living in at age 17 is below the national average than when growth is above the national average. Children who at age 17 reside in MSAs that experience good house price growth have a 47 percent probability of remaining in the top income quartile conditional on their

[35]The standard errors are calculated using the following formula:

$$\hat{\sigma}_{jk} = \sqrt{\frac{p_{jk} \times (1 - p_{jk})}{n_j}} \quad , \tag{3}$$

where p_{jk} is the probability of a household starting in position j and ending up in position k, and n_j is the number of households in position j. In our case, n_j is the number of parents who are in a given quartile of the income distribution, and p_{jk} is the probability of a child ending up in a given part of the earnings distribution conditional on the position of their parents when they were age 17. For additional details on this approach for calculating standard errors go to http://fedc.wiwi.hu-berlin.de/xplore/tutorials/xfghtmlnode32.html.

parents being in the top income quartile as compared to only a 27 percent probability for similar children who at age 17 live in areas that experience below average house price growth. This difference across income groups is statistically significant (t-statistic 11.7).[36] The result is especially interesting given that the children of high-income parents, other things equal, are more likely to attend college. The probability of children ending up in the lowest income quartile conditional on their parents being in a higher income group is also greater in the below average house price growth sample.

Unlike the sample of homeowners, house price growth does not appear to have a consistent influence on economic mobility for the sample of renters. Children living in areas of above average house price growth are slightly more likely to remain at the top of the income distribution than similar children living in areas of lower than average house price growth, conditional on their renter parents being at the top of the distribution. In contrast, children whose renter parents start in the first or third income quartiles are more likely to move to the top of the income distribution if they live in areas where house price growth was below average. A similarly varied pattern emerges if you consider children's downward mobility by location. House prices therefore do not seem to have much impact on the economic mobility of the children whose parents rented rather than owned a home, which is what we would expect if our story about house prices and children's future achievement is valid. Although these cross-tabulation results are only suggestive given the small sample sizes, they nevertheless tell a story consistent with our previous results about the effect of house prices on intergenerational economic mobility.

5 Conclusion

This paper's goal is to study how house price growth experienced during children's teenage years impacts their earnings as adults conditional on their parents' income. We find that house price appreciation has a positive impact on the earnings of children

[36]This inference is based on a difference of means test with unequal variance. There are 28 degrees of freedom.

whose parents were homeowners even after controlling for the standard channels that help explain the earnings gap across individuals. House price growth has a particularly strong impact on the earnings of children whose parents are potentially liquidity constrained homeowners. We further found that house price growth increases the likelihood of children obtaining a college degree and results in lower unsecured (college-related) debt holdings when they are adults. Overall, our results are consistent with rising house prices providing parents with an additional resource (borrowing collateral) to invest in their children's human capital.

Our estimated effects are also economically meaningful. Within the sample of homeowners, the children from households that experience house price growth in the top quartile of the distribution have over 6 percent higher annual earnings as adults than the children whose families experience house price changes in the bottom quartile of the distribution. Our findings are robust to a number of alternative specifications and are consistent with anecdotal evidence on the benefits of home equity-related household borrowing.

The results in this paper also suggest some potential avenues for future research. One is to explore whether house price appreciation impacts children's college attendance (or completion) and also affects their college choice. Lovenheim and Reynolds (2010) explore the college choice aspect, but it would also be interesting to see whether the house price and college choice channel also has an impact on children's future earnings. Having data to explore whether children are indeed able to work less while enrolled in college if their parents can finance more of their education would also be interesting. Considering the direct effect house price growth during their teens has on children's college-related debt, and not just their overall unsecured debt, would also be worthwhile given the appropriate dataset, as it would be important to study if debt holdings affect job choices. There is also work to be done on how the great recession impacted children's college choices and future earnings. Overall, this paper contributed to the earnings mobility and educational achievement literatures, but there is certainly interesting work to be done when additional data become available.

References

Alison Aughinbaugh. Reapplication and extension: Intergenerational mobility in the united states. *Labour Economics*, 7(6):785–796, November 2000.

Gary Becker. Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70(5):9–49, 1962.

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

Debopam Bhattacharya and Bhashkar Mazumder. A Nonparametric Analysis of Black-White Differences in Intergenerational Income Mobility in the United States. Working Paper 2007-12, Chicago, IL: Federal Reserve Bank of Chicago, 2007. Available at: http://www.chicagofed.org/webpages/publications/working_papers/2007/wp_12.cfm.

Thomas P. Boehn and Alan M. Schlottmann. Does home ownership by parents have an economic impact on their children? *Journal of Housing Economics*, 8(3):217–232, 1999.

Meta Brown, John Karl Scholz, and Ananth Seshadri. A new test of borrowing constraints for education. 2009.

Stephen V. Cameron and Christopher Taber. Estimation of educational borrowing constraints using returns to schooling. *Journal of Political Economy*, 112(1):132–182, 2004.

Pedro Carneiro and James J. Heckman. The evidence on credit constraints in post-secondary schooling. *The Economic Journal*, 112(482):705–734, 2002.

Kerwin Kofi Charles and Erik Hurst. The correlation of wealth across generations. *Journal of Political Economy*, 111(6):1155–1182, December 2003.

Kerwin Kofi Charles, Sheldon Danziger, Geng Li, and Robert F. Schoeni. New Expenditure Data in the Panel Study of Income Dynamics: Comparisons with the Consumer Expenditure Survey Data. *Monthly Labor Review*, 133(2):29–39, 2010.

Daniel Cooper. Impending Spending Bust? The Role of Housing Wealth as Borrowing Collateral. Working paper 09-9, Boston, MA: Federal Reserve Bank of Boston, 2009. Available at: http://www.bos.frb.org/economic/ppdp/2009/ppdp0909.htm.

Gordon Dahl and Lance Lochner. The Impact of Family Income on Child Achievement: Evidence from the Earned Income Tax Credit. *American Economic Review,* Forthcoming, 2011.

Susan Dynarski. Loans, liquidity, and schooling decisions. Working Paper. Available at: http://www.nber.org/~dynarski/Dynarski_loans.pdf, 2003.

Gary V. Engelhardt and Christopher J. Mayer. Intergenerational transfers, borrowing constraints, and saving behavior: Evidence from the housing market. *Journal of Urban Economics*, 44(1):135–157, 1998.

Kristopher S. Gerardi, Harvey S. Rosen, and Paul S. Willen. The Impact of Deregulation and Financial Innovation on Consumers: The Case of the Mortgage Market. *Journal of Finance*, 65(1):333–360, February 2010.

Warren B. Hrung. Parental housing values and children's consumption. *Regional Science and Urban Economics*, 32(4):521–529, 2002.

Warren B. Hrung. Parental net wealth and personal consumption. *Journal of Economic Behavior and Organization*, 54(4):551–560, 2004.

Dmytro Hryshko, Maria J. Luengo-Prado, and Bent E. Sorensen. House prices and risk sharing. *Journal of Monetary Economics*, 57(8):975–987, 2010.

Michael Lovenheim. Housing Wealth, Liquidity Constraints and College Enrollment. *Journal of Labor Economics,* Forthcoming, 2011.

Michael Lovenheim and C. Lockwood Reynolds. The effect of housing wealth on college choice: Evidence from the housing boom. Working Paper. Available at: http://www.human.cornell.edu/pam/people/upload/Housing-Wealth-and-College-Choice.pdf, 2010.

Bhashkar Mazumder. The apple falls even farther from the tree than we thought: New and revised estimates of the intergenerational inheritance of earnings. In Gintis H. Bowles, S. and Osborne-Groves M, editors, *Intergenerational Inequality*. Princeton, 2005.

Pamela Morris and Greg J. Duncan. Does Money Really Matter? Estimating Impacts of Family Income on Young Children's Achievement with Data from Random Assignment Experiments. *Developmental Psychology*, June 2011.

Casey Mulligan. *Parental Priorities and Economic Inequality*. Chicago, IL: The University of Chicago Press, 1997.

Philip Oreopoulos, Marianne E. Page, and Ann Stevens. The Intergenerational Effects of Worker Displacement. *Journal of Labor Economics*, 26(3):455–484, July 2008.

Gary Solon. Intergenerational Income Mobility in the United States. *American Economic Review*, 82(3):393–408, June 1992.

Hal White. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica*, 48(4):817–838, May 1980.

David Zimmerman. Regression Toward Mediocrity in Economic Stature. *American Economic Review*, 82(3):409–429, June 1992.

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Parents					
Age	44.53	5.79	32	65	907
Family size	3.91	1.38	1	12	907
Homeowner	0.77	0.42	0	1	907
Years of Schooling (completed)	13.71	2.37	3	17	907
College or higher degree	0.24	0.43	0	1	907
Male head of household	0.86	0.35	0	1	907
Black[1]	0.18	0.38	0	1	906
Married	0.75	0.43	0	1	907
Two-year house price growth	0.03	0.10	–0.28	0.39	907
Two-year house price growth dummy	0.59	0.49	0	1	907
Two-year house price growth relative	0.02	0.09	–0.33	0.33	907
Two-year house price growth	0.05	0.17	–0.45	0.65	907
Four-year income growth (annualized)	0.03	0.11	–0.54	0.72	859
Family income (five-year average)	63417	53904	378	746907	913
Liquid wealth	48924	358525	-10230	9992737	847
Non-housing wealth	170819	610909	–330158	14393858	902
Asset income	1317	5957	0	91158	913
Below med. liq. wealth at age 17	0.35	0.48	0	1	841
Below med. liq. wealth × hp growth	0.01	0.05	–0.28	0.38	841
Below med. non-housing wealth at age 17	0.36	0.48	0	1	896
Below med. non-housing wealth × hp growth	0.01	0.05	-0.22	0.38	896
Below med. asset income	0.53	0.50	0	1	907
Below med. asset income × hp growth	0.02	0.06	–0.22	0.38	907
High income growth	0.50	0.50	0	1	859
High income growth × hp growth	0.02	0.08	–0.28	0.39	859
Children					
Age	33.97	5.32	25	45	907
Family size	2.61	1.50	1	9	907
Homeowner	0.53	0.50	0	1	907
Years of schooling (completed)	13.69	2.61	0	17	907
College or higher degree	0.40	0.49	0	1	907
Male head of household	0.72	0.45	0	1	907
Black[1]	0.17	0.38	0	1	902
Married	0.50	0.50	0	1	907
Family income (two-year average)[2]	52927	51467	554	634092	913
Labor income	44903	44325	0	376400	913

Notes: Statistics are weighted using the PSID family weights. Income and wealth figures are in real 2000 U.S. dollars. [1]Black headed households include heads of households who identify as bi-racial; [2]Includes one-year of income data for households without two years of income data available.

Table 2: Cross-correlations

Variables	Liquid wealth	Non-Housing wealth	Asset income	Forward income gr.	Below med. liq. wealth	Below med. n-housing wealth	Below med. asset inc.	High forward income gr.
Liquid wealth	1.00							
Non-housing wealth	0.19	1.00						
Asset income	0.13	0.43	1.00					
Future income growth	–0.00	0.02	0.06	1.00				
Below med. liq.wealth	–0.11	–0.24	–0.18	–0.09	1.00			
Below med. non-housing wealth	–0.11	–0.29	–0.19	–0.03	0.66	1.00		
Below med. asset inc.	–0.01	–0.13	–0.28	–0.10	0.43	0.39	1.00	
High forward income gr.	0.03	0.02	0.05	0.71	-0.10	–0.07	–0.11	1.00

Table 3: MSA House Price Growth and Income Growth: (Parents) Owners vs. Renters

	mean	**p50**	**std. dev.**	**min**	**max**	**N**
			Parent Renter			
MSA house price growth	0.019	0.014	0.082	–0.217	0.361	319
MSA income growth	0.029	0.029	0.035	-0.084	0.126	319.000
MSA unemployment rate	0.058	0.054	0.020	0.023	0.157	269
			Parent Owner			
MSA house price growth	0.022	0.015	0.092	–0.280	0.391	594
MSA income growth	0.033	0.033	0.038	-0.090	0.143	594
MSA unemployment rate	0.058	0.053	0.023	0.022	0.208	467

Table 4: Children's Family Income and House Price Growth.

	All			Renters	Owners				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log. parent income, five-yr avg.	0.434***	0.402***	0.402***	0.237***	0.476***	0.445***	0.465***	0.483***	0.481***
	(0.045)	(0.046)	(0.046)	(0.069)	(0.077)	(0.083)	(0.087)	(0.079)	(0.081)
House price growth at age 17			0.228	–1.220**	0.757**	0.312	0.180	0.224	0.047
			(0.304)	(0.565)	(0.348)	(0.349)	(0.326)	(0.385)	(0.577)
Below med. non-housing wealth						–0.120*			
						(0.073)			
Below med. wealth × hp growth						1.646**			
						(0.825)			
Below med. liq. wealth							–0.044		
							(0.084)		
Below med. liq. w. × hp growth							1.628*		
							(0.919)		
Below med. asset income								0.003	
								(0.067)	
Below med. asset income × hp growth								1.212*	
								(0.674)	
High income growth									–0.039
									(0.064)
High inc. growth × hp growth									1.202*
									(0.700)
N	913	913	913	319	594	592	551	594	567
R-squared	0.32	0.34	0.34	0.21	0.35	0.36	0.35	0.36	0.36

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,17} + \beta_3 g^{h,17} \times d^{i,p} + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $g^{h,17}$ is real house price growth in the MSA in which the parents and child lived over the two years prior to the child turning 17, and $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise. Additional controls for columns (2)-(9) only: age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, five-year cohort dummies for respondent and fixed-effects for the state where the respondent lived at age 17. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

TABLE 5: CHILDREN FAMILY INCOME AND HOUSE PRICE GROWTH. ADDITIONAL CONTROLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Two-year Price Growth Dummy		Two-year Price Growth Relative		Two-year Price Growth					
					Squared Term		House Value		Birth-year Dummies	
Log. parent income, five-yr avg.	0.485***	0.454***	0.476***	0.443***	0.480***	0.446***	0.386***	0.372***	0.362***	0.349***
	(0.076)	(0.082)	(0.076)	(0.083)	(0.077)	(0.083)	(0.083)	(0.088)	(0.082)	(0.088)
House-price growth at age 17	0.140**	0.098	1.115***	0.672*	0.889**	0.407	0.950**	0.504	1.255***	0.761*
	(0.063)	(0.071)	(0.351)	(0.361)	(0.431)	(0.401)	(0.418)	(0.390)	(0.428)	(0.390)
Below med. non-housing wealth		–0.148		–0.090		–0.120*		–0.076		–0.073
		(0.107)		(0.072)		(0.073)		(0.072)		(0.075)
Below med. × hp gr.		0.101		1.693*		1.600**		1.503*		1.712**
		(0.138)		(0.927)		(0.804)		(0.789)		(0.811)
House-price growth sq.					–1.455	–0.948	–1.845	–1.331	–2.232	–1.672
					(1.858)	(1.626)	(1.802)	(1.592)	(1.892)	(1.675)
Log. parents' house value age 17							0.153***	0.144***	0.175***	0.167***
							(0.050)	(0.050)	(0.052)	(0.052)
N	592	592	592	592	592	592	592	592	592	592
R-squared	0.36	0.36	0.36	0.37	0.36	0.36	0.37	0.37	0.38	0.39

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,17} + \beta_3 g^{h,17} \times d^{i,p} + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $g^{h,17}$ is real house price growth in the MSA in which the parents and child lived over the two years prior to the child turning 17 (variations indicated by column headings), and $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise. Additional controls: age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, fixed-effects for the state where the respondent lived at age 17 and 5-year cohort dummies for respondent, except columns (9)-(10) with birth-year dummies instead. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 6: Children Family Income and House Price Growth. House Price Growth Variations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	One-year Price Growth				Four-year Price Growth				Cumulative Price Growth			
	Low wealth		High Inc. gr.		Low wealth		High Inc. gr.		Low wealth		High Inc. gr.	
Log. parent income, five-yr avg.	0.480***	0.446***	0.470***	0.480***	0.479***	0.445***	0.470***	0.483***	0.478***	0.447***	0.467***	0.471***
	(0.077)	(0.083)	(0.078)	(0.081)	(0.077)	(0.084)	(0.078)	(0.080)	(0.077)	(0.083)	(0.078)	(0.079)
House-price growth at 17	1.267**	0.335	1.250*	0.250	0.398*	0.279	0.360*	–0.095	0.502***	0.458**	0.444**	0.043
	(0.633)	(0.641)	(0.651)	(1.065)	(0.206)	(0.225)	(0.209)	(0.353)	(0.178)	(0.189)	(0.181)	(0.322)
Constrained		–0.126*		–0.035		–0.106		–0.049		–0.089		–0.049
		(0.073)		(0.065)		(0.074)		(0.063)		(0.073)		(0.062)
Constrained × hp gr.		3.663**		1.766		0.334		0.847**		0.070		0.682*
		(1.499)		(1.296)		(0.462)		(0.413)		(0.399)		(0.368)
N	592	592	567	567	592	592	567	567	592	592	567	567
R-squared	0.35	0.36	0.36	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.36	0.36

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,17} + \beta_3 g^{h,17} \times d^{i,p} + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $g^{h,17}$ is real house price growth in the MSA in which the parents and child lived prior to the child turning 17 (variations indicated by column headings), and $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise. Additional controls age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, fixed-effects for the state where the respondent lived at age 17 and 5-year cohort dummies for respondent, except columns (9)-(10) with birth-year dummies instead. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 7: Children's Family Income and House Price Growth (When Kids are 21)

	All			Renters	Owners				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log.Parent Income, 5-y avg.	0.433***	0.399***	0.399***	0.319***	0.426***	0.387***	0.423***	0.430***	0.476***
	(0.051)	(0.052)	(0.051)	(0.080)	(0.063)	(0.094)	(0.094)	(0.087)	(0.097)
House Price Growth at 21			0.443	0.964	0.297	0.094	0.068	0.071	0.552
			(0.354)	(0.851)	(0.423)	(0.442)	(0.466)	(0.509)	(0.632)
Below med. non-housing wealth						–0.188*			
						(0.099)			
Below med. wealth × hp gr.						1.110			
						(0.937)			
Below med. liquid wealth							–0.096		
							(0.113)		
Below med. liq. w. × hp gr.							1.145		
							(1.089)		
Below med. asset income								–0.035	
								(0.085)	
Below med. asset income × hp gr.								0.544	
								(0.776)	
High income growth									0.048
									(0.084)
High inc. gr. × hp gr.									–0.237
									(0.761)
N	731	731	731	209	484	481	443	484	461
R-squared	0.33	0.35	0.35	0.24	0.35	0.36	0.36	0.35	0.36

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,21} + \beta_3 g^{h,21} \times d^{i,p} + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $g^{h,21}$ is real house price growth in the MSA in which the parents lived over the two years prior to the child turning 21, and $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise. Additional controls for columns (2)-(9) only: age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, five-year cohort dummies for respondent and fixed-effects for the state where the respondent lived at age 21. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 8: Possible Channels. Liquidity Constrained Owners

	(1)	(2)	(3)	(4)	(5)
Log. parent income, five-yr avg.	0.440***	0.362***	0.299***	0.189***	0.156*
	(0.089)	(0.088)	(0.081)	(0.070)	(0.087)
House price growth at age 17	0.296	0.442	0.376	0.665**	0.666
	(0.358)	(0.345)	(0.314)	(0.319)	(0.426)
Below med. no-housing wealth at age 17	–0.094	–0.054	–0.031	–0.042	–0.008
	(0.080)	(0.079)	(0.071)	(0.068)	(0.099)
Below med. wealth × hp growth	1.732**	1.515*	1.288	0.813	0.140
	(0.811)	(0.809)	(0.802)	(0.729)	(1.048)
Some college		0.095	0.115*	0.021	–0.025
		(0.073)	(0.065)	(0.064)	(0.086)
College or higher degree		0.388***	0.388***	0.209***	0.232***
		(0.070)	(0.064)	(0.061)	(0.084)
Married			0.685***	0.561***	0.612***
			(0.070)	(0.069)	(0.085)
Industry and occupation dummies	No	No	No	Yes	Yes
Current MSA dummies	No	No	No	No	Yes
N	543	543	543	543	543
R-squared	0.38	0.42	0.50	0.61	0.60

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,17} + \beta_3 g^{h,17} \times d^{i,p} + X'^{i,c}\gamma + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $g^{h,17}$ is real house price growth in the MSA where the parents and child lived over the two years prior to the child turning 17, $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise, and $X^{i,c}$ are the children controls indicated on the table. Additional controls: age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, five-year cohort dummies for respondent and fixed-effects for the state where the respondent lived at age 17. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 9: House Price Growth and Educational Attainment (Marginal Effects)

	House Price Growth Dummy			House Price Growth Continuous		
	High School or less	Some College	BA-BS or Higher	High School or less	Some College	BA-BS or Higher
	(1)	(2)	(3)	(4)	(5)	(6)
Parent head college dummy	–0.134	–0.011	0.168*	–0.156*	–0.028	0.187**
	(0.082)	(0.073)	(0.087)	(0.080)	(0.072)	(0.087)
Log. parent income, five-yr avg.	–0.131**	0.027	0.160**	–0.122**	0.014	0.157**
	(0.060)	(0.048)	(0.068)	(0.059)	(0.048)	(0.068)
House price growth at age 17	0.053	0.127**	–0.097	1.236***	0.309	–1.184**
	(0.070)	(0.063)	(0.069)	(0.451)	(0.381)	(0.469)
Low non-housing wealth dummy	0.167**	0.098	–0.224***	0.119*	0.006	–0.108*
	(0.081)	(0.079)	(0.077)	(0.062)	(0.058)	(0.061)
Low wealth × house price growth	–0.113	–0.137	0.275**	–0.201	–1.461**	1.957***
	(0.093)	(0.079)	(0.118)	(0.681)	(0.648)	(0.731)
Log. parents' house value at age 17	–0.102**	–0.021	0.114**	–0.091**	–0.018	0.102**
	(0.043)	(0.034)	(0.049)	(0.042)	(0.034)	(0.049)
Female	–0.047	–0.001	–0.057	–0.060	0.007	–0.052
	(0.058)	(0.052)	(0.057)	(0.058)	(0.051)	(0.057)
Black	0.059	–0.038	–0.168**	0.071	–0.047	–0.169**
	(0.075)	(0.068)	(0.069)	(0.075)	(0.067)	(0.069)
MSA unemployment rate at age 17	–0.006	–0.010	0.031**	0.010	–0.019	0.025
	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)
N	445	446	452	445	446	452
R-squared	0.19	0.10	0.25	0.20	0.10	0.26

Notes: Probit regressions. The LHS variable is a dummy variable equal to one if the child respondent follows within the education category indicated by the column heading and zero otherwise. Additional controls: five-year cohort dummies for respondents and fixed-effects for the state where the respondent lived at age 17. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, *significant at the 10 percent level.

Table 10: Children's Other Debt, College and House Prices

	Level	Log
	(1)	(2)
Some college or more (dummy)	5,582**	1.71***
	(2,518)	(0.57)
House price growth at age 17 (dummy)	5,053	–0.22
	(3,487)	(0.63)
Some college or more × house price growth	–6,894*	–1.43*
	(4,053)	(0.75)
N	582	582
R-squared	0.14	0.11

Notes: Linear regressions. LHS is other debt in dollars for the level specification and log(1+debt) for the log specification. Additional controls: average parental income, marital status, gender, race, age, age squared, family size and family size squared, five-year cohort dummies for respondents and fixed-effects for the state where the respondent lived at age 17. Robust standard errors in parentheses.

Table 11: Children of Owners: Transition Matrices by house price Growth in MSA at Age 17

All Sample size: 594				
	Children's Income Quartile			
Parents' Income Quartile	1	2	3	4
	%	%	%	%
1	43.3	30.3	16.3	10.1
	(3.7)	(3.4)	(2.8)	(2.3)
2	28.2	24.2	28.9	18.8
	(3.7)	(3.5)	(3.7)	(3.2)
3	22.2	19.3	34.8	23.7
	(3.6)	(3.4)	(4.1)	(3.7)
4	15.2	22.0	25.0	37.9
	(3.1)	(3.6)	(3.8)	(4.2)

house price growth higher than national average Sample size: 309				
	Children's Income Quartile			
Parents' Income Quartile	1	2	3	4
	%	%	%	%
1	43.9	28.0	15.9	12.2
	(5.8)	(5.3)	(4.3)	(3.8)
2	23.0	24.1	32.2	20.7
	(4.9)	(5.0)	(5.4)	(4.7)
3	20.6	22.1	32.4	25.0
	(4.3)	(4.4)	(4.9)	(4.6)
4	13.9	16.7	22.2	47.2
	(3.7)	(4.0)	(4.5)	(5.4)

house price growth lower or at national average Sample size: 285				
	Children's Income Quartile			
Parents' Income Quartile	1	2	3	4
	%	%	%	%
1	42.7	32.3	16.7	8.3
	(5.0)	(4.8)	(3.8)	(2.8)
2	35.5	24.2	24.2	16.1
	(6.1)	(5.4)	(5.4)	(4.7)
3	23.9	16.4	37.3	22.4
	(5.2)	(4.5)	(5.9)	(5.1)
4	16.7	28.3	28.3	26.7
	(4.8)	(5.8)	(5.8)	(5.7)

Table 12: Children of Renters: Transition Matrices by House-Price Growth in MSA at Age 17

All
Sample size: 319

Parents' Income Quartile	Children's Income Quartile 1 %	2 %	3 %	4 %
1	48.8	30.2	13.2	7.8
	(4.4)	(4.0)	(3.0)	(2.4)
2	37.2	25.6	23.1	14.1
	(5.5)	(4.9)	(4.8)	(3.9)
3	25.0	26.9	21.2	26.9
	(6.0)	(6.1)	(5.7)	(6.1)
4	18.3	28.3	30.0	23.3
	(5.0)	(5.8)	(5.9)	(5.5)

House-price growth higher than national average
Sample size: 180

Parents' Income Quartile	Children's Income Quartile 1 %	2 %	3 %	4 %
1	46.4	33.3	14.5	5.8
	(9.8)	(9.2)	(6.9)	(4.6)
2	37.0	28.3	19.6	15.2
	(6.1)	(5.7)	(5.0)	(4.5)
3	32.3	22.6	22.6	22.6
	(6.5)	(5.8)	(5.8)	(5.8)
4	23.5	26.5	23.5	26.5
	(6.8)	(7.1)	(6.8)	(7.1)

House-price growth lower or at national average
Sample size: 139

Parents' Income Quartile	Children's Income Quartile 1 %	2 %	3 %	4 %
1	51.7	26.7	11.7	10.0
	(6.5)	(5.7)	(4.1)	(3.9)
2	37.5	21.9	28.1	12.5
	(8.6)	(7.3)	(7.9)	(5.8)
3	14.3	33.3	19.0	33.3
	(7.6)	(10.3)	(8.6)	(10.3)
4	11.5	30.8	38.5	19.2
	(6.3)	(9.1)	(9.5)	(7.7)

6 Appendix Tables (for online publication only)

Supporting work to assess the robustness of our findings.

Table A-1: Summary statistics. Sub-sample of Parent Homeowners

Variable	Mean	Std. Dev.	Min.	Max.	N
Parents					
Age	45.22	5.51	33	65	590
Family size	4	1.17	1	10	590
Homeowner	1	0	1	1	590
Years of schooling (completed)	13.99	2.3	3	17	590
College or higher degree	0.27	0.45	0	1	590
Male head of household	0.93	0.25	0	1	590
Black[1]	0.11	0.31	0	1	589
Married	0.86	0.35	0	1	590
Two-year house price growth	0.03	0.10	–0.28	0.39	590
Two-year house price growth dummy	0.59	0.49	0	1	590
Two-year relative house price growth	0.02	0.09	–0.33	0.33	590
Four-year house price growth	0.05	0.17	-0.45	0.65	590
Four-year income growth (annualized)	0.03	0.10	–0.47	0.44	566
Family income (five-year average)	86437	59468	1523	746907	590
Liquid wealth	83687	462757	0	9992737	547
Non-housing wealth	319761	895064	–233043	14393858	588
Asset income	2564	8262	0	91158	590
Below med. liq. wealth at age 17	0.25	0.43	0	1	547
Below med. liq. wealth × hp growth	0	0.04	–0.28	0.38	547
Below med. non-housing wealth at age 17	0.26	0.44	0	1	588
Below med. non-housing wealth × hp growth	0	0.04	–0.20	0.38	588
Below med. asset income	0.44	0.50	0	1	590
Below med. asset income × hp growth	0.01	0.06	–0.20	0.38	590
High income growth	0.52	0.50	0	1	566
High inc. growth × hp growth	0.02	0.08	–0.28	0.39	566
Children					
Age	34.06	5.36	25	45	590
Family size	2.60	1.45	1	8	590
Homeowner	0.59	0.49	0	1	590
Years of schooling (completed)	13.94	2.67	0	17	590
College or higher degree	0.46	0.50	0	1	590
Male head of household	0.76	0.43	0	1	590
Black[1]	0.10	0.30	0	1	586
Married	0.53	0.50	0	1	590
Family income (two-year average)[2]	72056	66630	554	634092	590
Labor income	62184	56864	0	376400	590

Notes: Statistics are weighted using the PSID family weights. Income and wealth figures are in real 2000 U.S. dollars. [1]Black headed households include heads of households who identify as bi-racial; [2]Includes one-year of income data for households without two years of income data available.

Table A-2: Children's Family Income and House Price Growth: Local Economic Conditions

	Owners							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log. parent income, five-yr avg.	0.476***	0.445***	0.478***	0.450***	0.466***	0.460***	0.465***	0.463***
	(0.077)	(0.083)	(0.077)	(0.084)	(0.087)	(0.092)	(0.087)	(0.093)
House price growth at age 17	0.757**	0.312	1.087***	0.632	0.624	–0.064	0.910*	0.230
	(0.348)	(0.349)	(0.419)	(0.406)	(0.477)	(0.451)	(0.515)	(0.487)
Below med. non-housing wealth		–0.120*		–0.110		–0.061		–0.049
		(0.073)		(0.074)		(0.078)		(0.079)
Below med. wealth × hp gr.		1.646**		1.620**		2.417**		2.319**
		(0.825)		(0.818)		(1.068)		(1.050)
MSA income growth at age 17			–1.810	–1.700			–2.330*	–2.143
			(1.200)	(1.194)			(1.361)	(1.341)
MSA unemployment Rate at age 17					–0.017	–0.010	–0.029	–0.022
					(0.022)	(0.021)	(0.023)	(0.022)
N	594	592	594	592	467	465	467	465
R-squared	0.35	0.36	0.36	0.36	0.31	0.31	0.31	0.32

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,17} + \beta_3 g^{h,17} \times d^{i,p} + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $g^{h,17}$ is real house price growth in the MSA in which the parents and child lived over the two years prior to the child turning 17, and $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise. Unemployment rate data are not available for all MSAs. Additional controls: age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, five-year cohort dummies for respondent and fixed-effects for the state where the respondent lived at age 17. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table A-3: Children Family Income and House Price Growth. Clustered Standard Errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline		Clustered Errors					
			MSA		State		Household	
Log. parent income, five-year avg.	0.476***	0.445***	0.476***	0.445***	0.476***	0.445***	0.476***	0.445***
	(0.077)	(0.083)	(0.101)	(0.105)	(0.084)	(0.086)	(0.079)	(0.085)
House price growth at age 17	0.757**	0.312	0.757	0.312	0.757**	0.312	0.757**	0.312
	(0.348)	(0.349)	(0.486)	(0.382)	(0.369)	(0.299)	(0.348)	(0.358)
Below med. non-housing wealth		–0.120*		–0.120		–0.120		–0.120*
		(0.073)		(0.082)		(0.077)		(0.072)
Below med. wealth × hp growth		1.646**		1.646**		1.646**		1.646**
		(0.825)		(0.783)		(0.822)		(0.776)
N	594	592	594	592	594	592	594	592
R-squared	0.35	0.36	0.35	0.36	0.35	0.36	0.35	0.36

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,17} + \beta_3 g^{h,17} \times d^{i,p} + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $g^{h,17}$ is real house price growth in the MSA in which the parents and child lived over the two years prior to the child turning 17, and $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise. Additional controls age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, fixed-effects for the state where the respondent lived at age 17 (except for columns (9)-(10) with MSA fixed effects) and five-year cohort dummies for respondent, except columns (9)-(10) with birth-year dummies instead. Clustered standard errors in parentheses as indicated by each column heading. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

TABLE A-4: CHILDREN'S FAMILY INCOME AND HOUSE PRICE GROWTH. ASYMMETRY

	Renters	Owners
	(1)	(2)
Log. parent income, five-yr avg.	0.240***	0.477***
	(0.069)	(0.077)
House price growth ≤ 0	–2.490**	1.048
	(1.255)	(0.862)
House price growth > 0	–0.542	0.584
	(0.826)	(0.465)
N	319	594
R-squared	0.21	0.35

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 p^{h,17} + \beta_3 n^{h,17} + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $p^{h,17}$ is a dummy variable equal to 1 if house price growth in the MSA in which the parents and child lived over the two years prior to the child turning 17 experienced housing appreciation and zero otherwise; $n^{i,p}$ is analogously defined for housing depreciation. Additional controls: age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, 5-year cohort dummies for respondent and fixed-effects for the state where the respondent lived at age 17. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table A-5: Children's Family Income and House Price Growth (Alternative Sample)

	All			Renters	Owners				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log.Parent Income, 5-y avg.	0.433***	0.402***	0.402***	0.202***	0.478***	0.435***	0.458***	0.470***	0.473***
	(0.051)	(0.052)	(0.052)	(0.069)	(0.065)	(0.103)	(0.103)	(0.097)	(0.103)
House Price Growth at 17			0.165	–1.382*	0.701*	0.204	0.060	0.126	–0.086
			(0.338)	(0.713)	(0.390)	(0.366)	(0.341)	(0.412)	(0.612)
Below med. non-housing wealth						–0.155*			
						(0.084)			
Below med. wealth × hp gr.						1.942**			
						(0.866)			
Below med. liquid wealth							–0.069		
							(0.095)		
Below med. liq.w. × hp gr.							1.926*		
							(0.981)		
Below med. asset income								–0.047	
								(0.076)	
Below med. asset income × hp gr.								1.333*	
								(0.715)	
High income growth									0.003
									(0.074)
High inc. gr. × hp gr.									1.284*
									(0.748)
N	731	731	731	250	481	479	441	481	457
R-squared	0.33	0.34	0.34	0.17	0.37	0.38	0.37	0.37	0.37

Notes: We estimate $y^{i,c} = \beta_0 + \beta_1 y^{i,p} + \beta_2 g^{h,17} + \beta_3 g^{h,17} \times d^{i,p} + e_i$, where $y^{i,c}$ and $y^{i,p}$ are the log of family income for child and parent respectively, averaged over several periods as described in the text. $g^{h,17}$ is real house price growth in the MSA in which the parents and child lived over the two years prior to the child turning 17, and $d^{i,p}$ is an indicator variable that takes a value of one if the parent(s) is (are) likely liquidity constrained and zero otherwise. Overall sample corresponds to that used in Table 4. Additional controls for columns (2)-(9) only: age, age squared and age cubed for child respondent and parent, family size and family size squared for respondent and parent, five-year cohort dummies for respondent and fixed-effects for the state where the respondent lived at age 17. Robust standard errors in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.