

Housing Wealth, *Inter Vivos* Money Transfers, and College Enrollment in the U.S.

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DRAFT PAPER—All customary caveats apply

Acknowledgments. Some of the data used in this analysis are derived from Restricted Data Files of the Panel Study of Income Dynamics, obtained under special contractual arrangements designed to protect the anonymity of the respondents. These data are not available from the authors. Persons interested in obtaining PSID Restricted Data Files should contact through the internet at PSIDHelp@isr.umich.edu. The collection of data used in this study was partly supported by the National Institutes of Health under grant number R01-HD069609 and the National Science Foundation under award number 1157698. For parts of our analyses which do not use restricted-use data, we make all the files required for replication publicly available.

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Abstract. Research in sociology and economics has long recognized the importance of parental wealth in determining children's life chances. While a related literature has emerged on the positive relationship between homeownership and specific outcomes like the college enrollment or wages in adulthood, causal inference and the identification of specific mechanisms are made difficult by endogeneity biases and data availability. Using a newly available supplement measuring long-run *inter vivos* transfers from parents to children and geocoded data from the Panel Study of Income Dynamics (PSID), we exploit the exogenous variation in marginal land availability within bounded radii centered on Central Business Districts (CBD) to isolate a causal pathway between equity, transfers, and college matriculation. The results show a substantial effect of instrumented home equity on inter vivos transfers, and more modest evidence of an increased likelihood of college attendance. The effect of housing on transfers and attendance, however, is mainly concentrated among white children in areas that are relatively geographically constrained—i.e. coastal and mountain cities. This provisionally suggests that the advantage conferred by equity is mainly concentrated among those families who likely already lack substantial credit constraints, but that home equity is nevertheless an important resource for families sending children to college.

Wealth has long been considered analytically distinct from income in identifying the determinants of intergenerational trajectories, social stratification, and life chances (Conley 2001; Oliver and Shapiro 1990; Shanks 2007; Spilerman 2000; Yeung and Conley 2008). Wealth is at once more concentrated, more durable, and more easily transmissible across generations than income, and offers families a crucial buffer to smooth consumption levels when job losses, disability, or other household economic shocks occur (Hryshko et al. 2009). In terms of intergenerational advantage, assets can both directly and indirectly affect outcomes through numerous channels. Families with higher net worth may more easily and consistently provide stable, nurturing, and stimulating environments conducive to positive child development (Elliott 2013; Hao and Yeung 2015; Shanks and Robinson 2013), which may in turn confer cognitive and noncognitive benefits that are translated into higher educational attainment and wages later in the life course.

Some argue that these early environmental factors in the formation of human capital largely overwhelm the more tangible effects of wealth— i.e. a reduction in credit constraints, and a greater allowance for postsecondary education consumption— in real-world significance (Cameron and Heckman 2001; Carneiro and Heckman 2002; Heckman and Mosso 2014). To these researchers, poor families send their children to college less often than affluent ones not because they lack liquidity or access to credit at the threshold of adulthood, but because disadvantage is already 'baked-in' and cannot be effectively rectified. If late interventions in early adulthood are ineffective because the influence of wealth has already played its part, then easing credit constraints or offering postsecondary education subsidies would constitute an inefficient or even wholly ineffective allocation of policy resources.

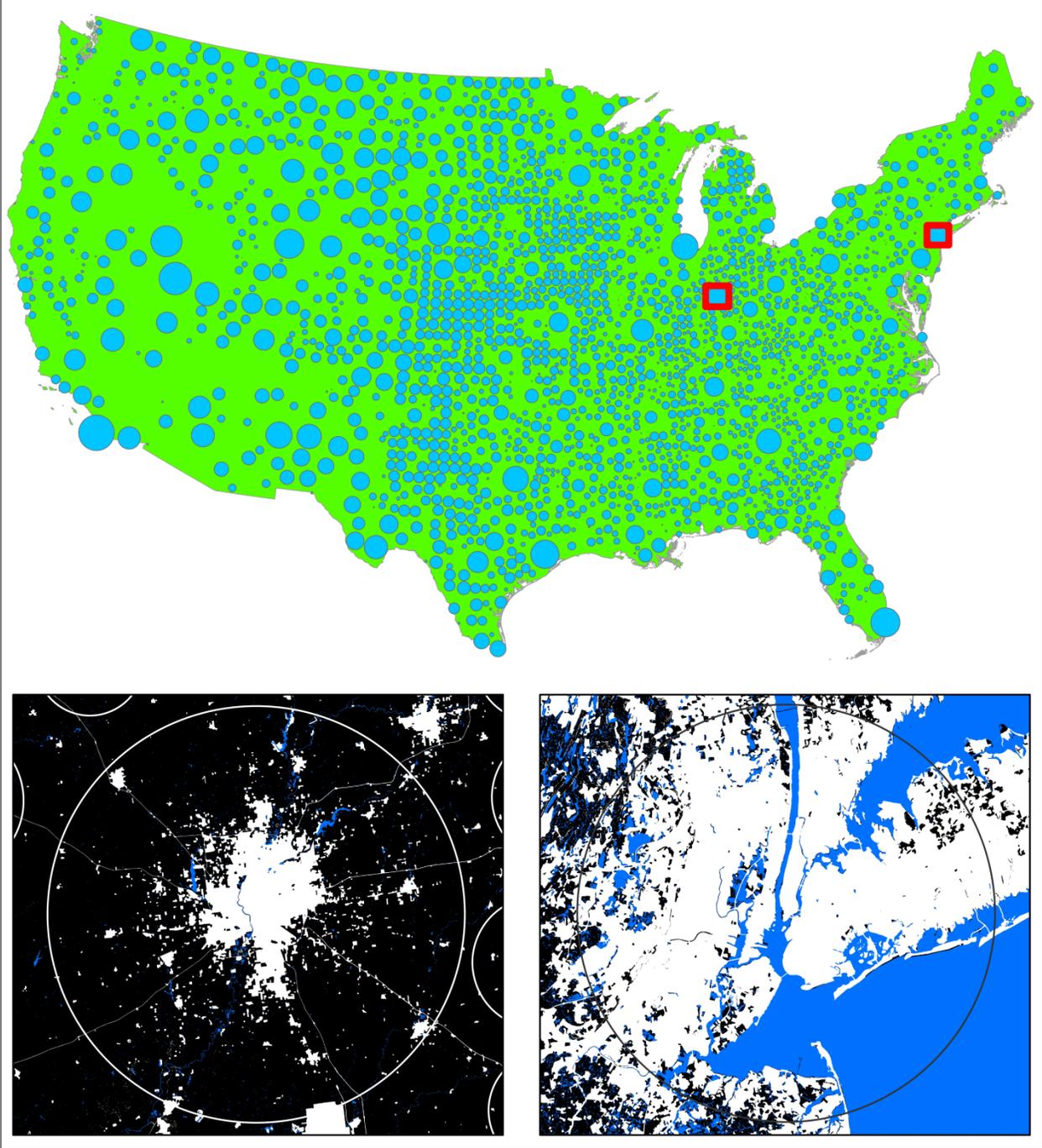
While wealth doubtlessly creates opportunities for favorable environmental conditions in the early stages of development, recent research has illustrated that more straightforwardly material channels that operate later in the life course may also play a significant role in outcomes like college enrollment and graduation. For instance, Winter (2014) finds that families are far more credit constrained than the 'early interventionists' estimate, which, coupled with reduced intrafamily transfers, contributes to the widening socioeconomic gaps in college enrollment (see also: Brown et al. 2012, and Lochner and Monge-Naranjo 2011). Of course, identifying 'pure' wealth effects—whether through material or intangible advantages conferred upon children—is made difficult because of the endogeneity of wealth and the possibility that results are driven by unmeasured factors. That is, there are likely unobservables in the error term which influence both wealth accumulation and educational attainment or the intergenerational transmission of advantage. Though one of the more obvious candidate confounders—inherited genetic background—seems to lack any compelling empirical support (Black et al. 2015), disentangling the relationship between wealth and intergenerational advantage remains empirically difficult.

Here, we focus on the possible material benefits of one specific form of wealth—home equity—and how it affects educational *inter vivos* cash transfers and college matriculation, using both geocoded Panel Study of Income Dynamics (PSID) data along with a recently released supplemental file on long-term intrafamily exchanges (Schoeni et al. 2015). We first focus on transfers as our outcome of interest, as they are a common phenomenon among the rich and poor alike when sending kids to college (see Keane and Wolpin 2001), and constitute a readily identifiable, empirically concrete mechanism between family assets and educational outcomes. We then use the same analytic approach to predict college matriculation among our subsample of 18- and 19-year-olds from 1999 to present.

To address endogeneity bias, we exploit the plausibly exogenous variation in marginal developable land availability in buffered zones circumscribed by political boundaries across the U.S., centered on either the central business districts (CBDs) which anchor them, or in the case of people residing in counties unaffiliated with urban agglomerations, their centroids (See Figure 1 for a visual illustration). Following Saiz (2010), who demonstrates that areas characterized by topographic and geographic constraint on development are also characterized by inelastic housing markets and more restrictive regulatory regimes, we use this measure of peripheral land availability as an exogenous determinant of both baseline equity and equity growth during the housing boom. First stage estimates demonstrate that our measure of land availability is strongly associated with equity levels at transition to adulthood, and we also provide suggestive evidence that it is exogenous to our outcomes of interest in the results.

We find a strong causal effect of equity—and more modest but still significant effects of equity growth—on *inter vivos* transfers. We also find mixed evidence of equity's effect on college enrollment; the effect of total equity is null, while growth in equity is significant. The effects of equity on transfers and enrollment, though, are mainly concentrated among white families (though those with comparatively little wealth), partly consistent with recent findings of an apparently null effect of homeownership on economic mobility for most African Americans in the U.S. (Fox, forthcoming). First, we begin with a brief review of the relevant literature on wealth and transfers, homeownership effects, and the geographic determinants of home values and equity. We then outline our data and analytic strategy and present our results, along with a set of robustness checks to bolster confidence in our estimates and the exogeneity of our instrument. We conclude with a discussion of the implications of our findings and suggestions for future research.

Figure 1. Top: Buffer areas centered on 1) CBDs for metro- and micropolitan statistical areas and 2) centroids for counties not associated with larger urban areas. Bottom left: Indianapolis metro area. Bottom right: New York metro area. Areas in black represent undeveloped (but geographically buildable) land in 1976.



Family Wealth and *Inter Vivos* Transfers

Beginning with the influential work of Becker (1962), economists have taken great interest in how capital accumulation and investment operates in human terms. Much like firms invest in physical capital, economic theory holds that parents channel resources to their children which manifest in future returns—i.e. educational credentials and higher lifetime wages. In a simplified rendering of this schema, parents act as utility-maximizing agents who consider factors like their wealth, the children's initial endowment, and public expenditures, investing until the marginal return on education meets the market rate of return on assets (Becker and Tomes 1976; 1994). In contrast, Behrman et al. (1982) models parental investments partly on aversion to inequality rather than wholly on wealth maximization, and argues that parents engage in compensatory behavior when siblings have varying levels of baseline ability. In either case—whether parents are trying to maximize utility by reinforcing initial endowment (see: Aizer and Cunha 2012; Datar et al. 2010; Frijters et al. 2013) or engaging in compensatory measures (see: Hsin 2012)—they are, according to human capital theorists, making a conscious calculation of contemporaneous costs and future benefits when raising their children.

Of course, in any model of human capital accumulation, one crucially important determinant of the amount of investment in children is the financial constraint of the household (Becker and Tomes 1994: 265; Behrman 1982: 56). Indeed, one of the reliably consistent findings in the social sciences is the association between family resources—whether measured as income or wealth, but particularly the latter when both are included in statistical models—and positive educational outcomes for children. For instance, Conley (2001), Jez (2014), and Kim and Sherraden (2011) all find that household wealth is positively related to college enrollment

net a range of controls, including income, suggesting the primacy of asset holdings in determining adult trajectories. Nam and Huang (2009) and Huang (2013) similarly find that liquid assets affect matriculation and the intergenerational transmission of education, respectively. Shanks and Destin (2009) find that net worth positively predicts high school completion for their full sample, and the college enrollment of African Americans. And Loke (2013) illustrates that even for families who begin at more resource-poor baselines, asset accumulation over time results in similar educational outcomes compared to already-wealthy families. While specific results (i.e. whether wealth differentially affects high school graduation, college enrollment, college graduation, entrance into postgraduate education, etc.) sometimes differ based on model specification and data, the associations between family resources and positive educational outcomes are clear.

This relationship is nevertheless difficult to parse out. As we pointed out in the introduction, Heckman and colleagues (Cameron and Heckman 2001; Carneiro and Heckman 2002; Heckman and Mosso 2014) argue that wealth operates through early investments in human capital formation, and not through wealth effects (e.g. paying for college) later in life. They find that U.S. families are not sufficiently credit-constrained to the point where additional assets or public transfers would result in systematically higher college enrollment of poorer adolescents, primarily because of differential ability gains made earlier in the life course. That is, most children who would benefit from greater credit availability would be those that would attend regardless, with the possible exception of a small group of high-ability poor (Abbott et al. 2013). Still, other recent work arriving at qualitatively different conclusions on the credit constraints faced by Americans renders firm conclusions on this question difficult (Belley and Lochner

2007; Brown et al. 2012; Winter 2014), and the debate in economic circles on this issue is bound to continue.

For the purposes of this paper, we remain agnostic on the question of whether easing credit constraints specifically would propel more cognitively-able poor children into college. Regardless of the hypothetical welfare effects of additional subsidies or credit availability, intrafamily asset transfers at present represent a vital resource for students enrolled in college, and determinants of these *inter vivos* gifts is of substantial analytic interest in its own right. Unfortunately, since Steelman and Powell (1989; 1991) emphasized the importance of parental contributions specifically for college over two decades ago (and commented on the dearth of pertinent research), social scientists have remained largely silent on the issue, with relevant work mostly focusing on questions of whether credit constraints deter enrollment of otherwise capable children. Partly, this reflects the difficulty of finding data which contain information on education-related transfers, which highlights the value of the PSID Rosters and Transfers supplemental module we utilize in this paper.

Still, the general importance of parental transfers can be inferred from extant work. For instance, Keane and Wolpin (2001) estimate that a loss of parental transfers to children would result in the reduction of college enrollment by about a fifth, but this would occur mostly among well-educated families. More recently, Johnson (2013) finds that the bulk of the association between parental earnings and the educational attainment of children originates from transfers during college. Finally, Winter (2014) provides perhaps the most compelling evidence of the importance of transfers in educational attainment. Using counterfactual experiments, he finds that the confluence of tuition increases, a shifting income and wealth distribution, and increasing returns to college raise the importance of intrafamily transfers, and that the inability of poorer

families to keep up in terms of gifts for college can explain much of the divergence in educational attainment since 1980. He also concludes that nearly 30% of families are credit constrained, which is far higher than previous estimates. These findings suggest that in addition to indirectly investing in their future through consuming more and better housing, locating in safe neighborhoods with high-quality schools, and promoting cultivation and enrichment through activities, parents also offer substantial tangible resources to their children in the form of direct transfers of money—but particularly for the purposes of (and often contingent on) college attendance.

Housing and Home Equity

While housing wealth is not a purely liquid asset like savings or investments, it possesses numerous features which make it particularly attractive for financing college education (primarily though not exclusively through refinancing existing mortgages) compared to other channels. First, unlike noncollateralized debt, the interest on mortgage payments has been tax deductible since the 1980s. Also unlike other consumer debt, it offsets a household's assets when applying for financial aid either in the form of subsidized government loans or grants, or through institutional need-based aid. Moreover, in the Free Application for Federal Student Aid (FAFSA), wealth is measured only as liquid holdings. Home equity on the primary residence has not been counted in federal formulas since the Higher Education amendments of 1992 (Dynarski 2003), such that housing assets cannot raise the Expected Family Contribution (EFC) as calculated by the government.

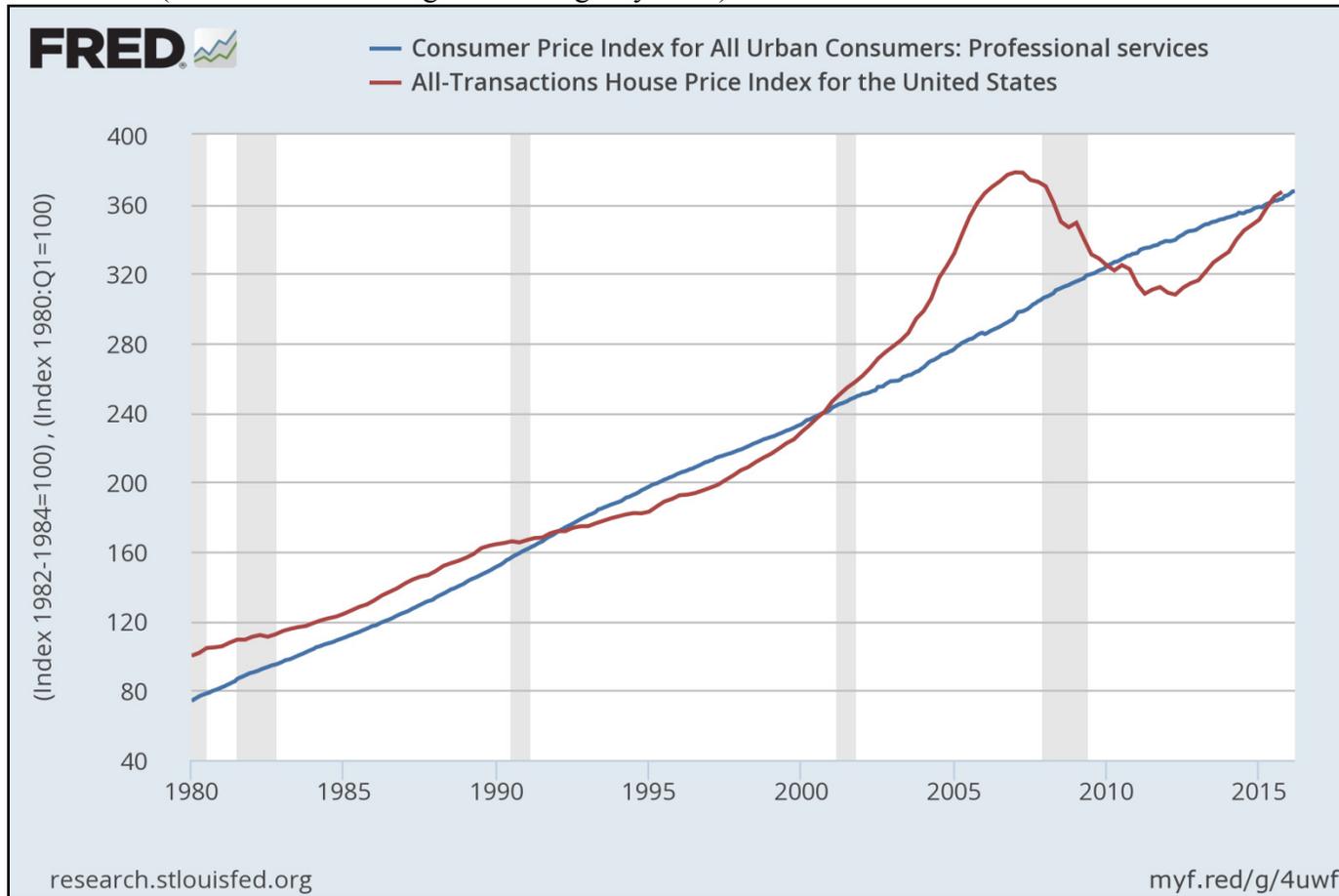
Schools that determine need based on proprietary formulas rather than relying only on the FAFSA differ in how they consider equity in packaging aid. For schools that take housing wealth

into account, taking out a collateralized loan not only offers liquidity that can be tapped in the transition to college, but also reduces the reportable assets of the household and would, *ceteris paribus*, boost financial aid. Housing can thus act as a crucial source of liquidity *and* may be leveraged to avoid higher EFCs for families with sufficient equity to take a cash-out refinance or by utilizing other instruments (e.g. Home Equity Line of Credit, or HELOC) using the home as collateral. Another reason that home equity may represent a uniquely important dimension of wealth vis-à-vis *inter vivos* transfers and educational attainment is the simple fact that for most households, it represents the lion's share of asset holdings.

For the middle three quintiles of Americans, the principal residence comprises a full two thirds of their total assets, while stocks, securities, and mutual fund investments total only about 3% of holdings (Wolff 2014). The importance of housing only intensifies as one descends the income and wealth gradient, and indeed represents the most valuable chip many parents have to cash in when they face an expensive, discrete life event like sending kids to college. During housing booms like the one preceding the Great Recession, asset accumulation and equity growth were so substantial and rapid that they provided uniquely lucrative avenues for families to finance consumption compared to the decades prior. Indeed, even during the relatively cooler 1989-2001 period, Bostic et al. (2009) find elasticities between housing wealth and household consumption to be significantly higher (approximately .06) than estimates of the parallel effects of liquid wealth, and are of a magnitude that reverberates through the entire economy (see also: Cooper 2013). Currently, the appreciation in home values is again beginning to outpace inflation, and prices are returning to their pre-recession highs (see Figure 2).

One may intuit that poorer students may not receive transfers through an equity channel because they have lower costs of attendance based on their EFC in the first place. Indeed, in this

Figure 2. House price trends, 1980-present (red line) and inflation (blue line); shaded areas indicate recessions. (U.S. Federal Housing Finance Agency 2016)



sample, less affluent children hold about 55% of the student debt of their richer counterparts, using \$70,000 in real family income at transition to college (18- or 19-years-old) as the cut point. Yet even poor students virtually never get a 'free ride' through grants outside of a select number of elite and tremendously wealthy universities, and are customarily expected to incur debt through federally subsidized loans at the least as part of their aid package (Brown et al. 2012). Further, Keane and Wolpin (2001) estimate that even less advantaged students typically receive thousands of dollars in transfers during their undergraduate years. Increased family liquidity can help parents pay subsidized loans off faster, smooth out consumption trends for kids in college, and offer an important buffer when transitioning to the labor market.

Research on the effects of housing assets and equity on child outcomes is limited compared to more general wealth effects, but paints a similar picture. Cooper and Luengo-Prado (2015) estimate that a one percent increase in metropolitan home values at age 17 in their restricted PSID sample corresponds to 0.9 percent higher annual income for children of homeowners, and 1.5 percent lower annual income for their renter peers. With respect to equity effects on educational outcomes, Zhan and Sherraden (2011) find that nonfinancial wealth like home equity in addition to liquidity is associated with college completion. Lovenheim (2011) instruments equity at the transition to college age with prior growth in equity to estimate the effect on college enrollment, finding that \$10,000 in net housing wealth corresponds to a 5.7% increase in enrollment for poorer children. Using a similar methodological approach, Lovenheim and Reynolds (2013) also show that equity directly relates to the quality of the institutions where students matriculate. These findings suggest that housing wealth may play an important role in postsecondary outcomes, but particularly for families who are on the margins of attendance or lower on the socioeconomic ladder.

Geography, Building Rules, and Housing Prices

Because increases in the market value of homes promote net gains in equity for owners, it is important to understand how and why prices vary within and among urbanized regions. In the classic models of Alonso (1964), Mills (1967), and Muth (1969), the cost of housing in a given monocentric (i.e. possessing a single dominant commercial center) city-region is a function of its distance to the CBD. Consumers trade lower home prices for longer and more expensive commutes in an effort to maximize their utility (or vice versa). Thus the spatial growth of urban areas is modeled as a result of cheap land being consumed on the periphery as home prices increase closer to the CBD, until spatial equilibrium is met whereby agents have optimized their levels of expenditure on housing, transportation, and other amenities based on their preferences (e.g. trading cramped, expensive housing downtown for tedious, expensive commutes to the suburbs). Of course, there are any number of self-evident realities which complicate this model, from ubiquitous pockets of deprivation proximate to city centers (e.g. Glaeser et al. 2008) to the increasingly polycentric form of urban areas (Modarres 2011). Still, the basic tenets of the model have held up consistently well to empirical testing since its popularization (e.g. Brueckner and Fansler 1983; Spivey 2007; Paulsen 2012). All else equal, home values will inevitably decline the greater distance one gets from activity centers, jobs, and other core-area amenities.

Housing markets can become highly inelastic, however, when there are natural or artificial barriers to consuming cheap land on the urban periphery—i.e. markets cannot respond to the growth in prices with relatively inexpensive, marginal development—which introduces inter-city differences in cost. One particularly popular candidate factor among economists in explaining housing market inelasticity and divergent regional home values are local regulatory

regimes. Unlike other countries where urban planning is frequently guided from above on regional or even national scales (see: Hirt 2012), U.S. municipalities set their own building rules, and frequently zone areas such that new construction is expensive, time intensive, and legally fraught through the requirement of large lots, environmental reviews, or other bureaucratic mechanisms.

Glaeser and colleagues (Glaeser et al. 2005; Glaeser et al. 2006) have popularized the notion that such restrictions on building are the prime culprit for the tendency of housing values to far outstrip construction costs, which suggests artificially high land values. In this schema, homeowners exert influence on new development, and desire tighter controls after buying in to discourage population flows and to promote appreciation. More recent research has incorporated the influence of geography on new development and housing prices, while conceptually and empirically connecting it to the robustness of regulatory regimes. Natural geography and the impediments to development—oceans, mountains, deserts, etc.—induce lower elasticities, and raise prices. Homeowners then exert influence to preserve those home values, which intensifies the artificial barriers to growth in the form of more restrictive regulation, such that natural and social factors operate in a complementary fashion to reduce elasticity. The work of Saiz (2010) is influential in this regard, and demonstrates that land availability operates to reduce supply elasticities both directly through the sheer lack of marginal area and indirectly through higher incentives for enacting barriers to new construction. More recent research (e.g. Hilber and Nicoud 2013; Paciorek 2013) comes to the similar conclusion that home prices are systematically related to geography and the antigrowth regulations which arise from those baseline conditions.

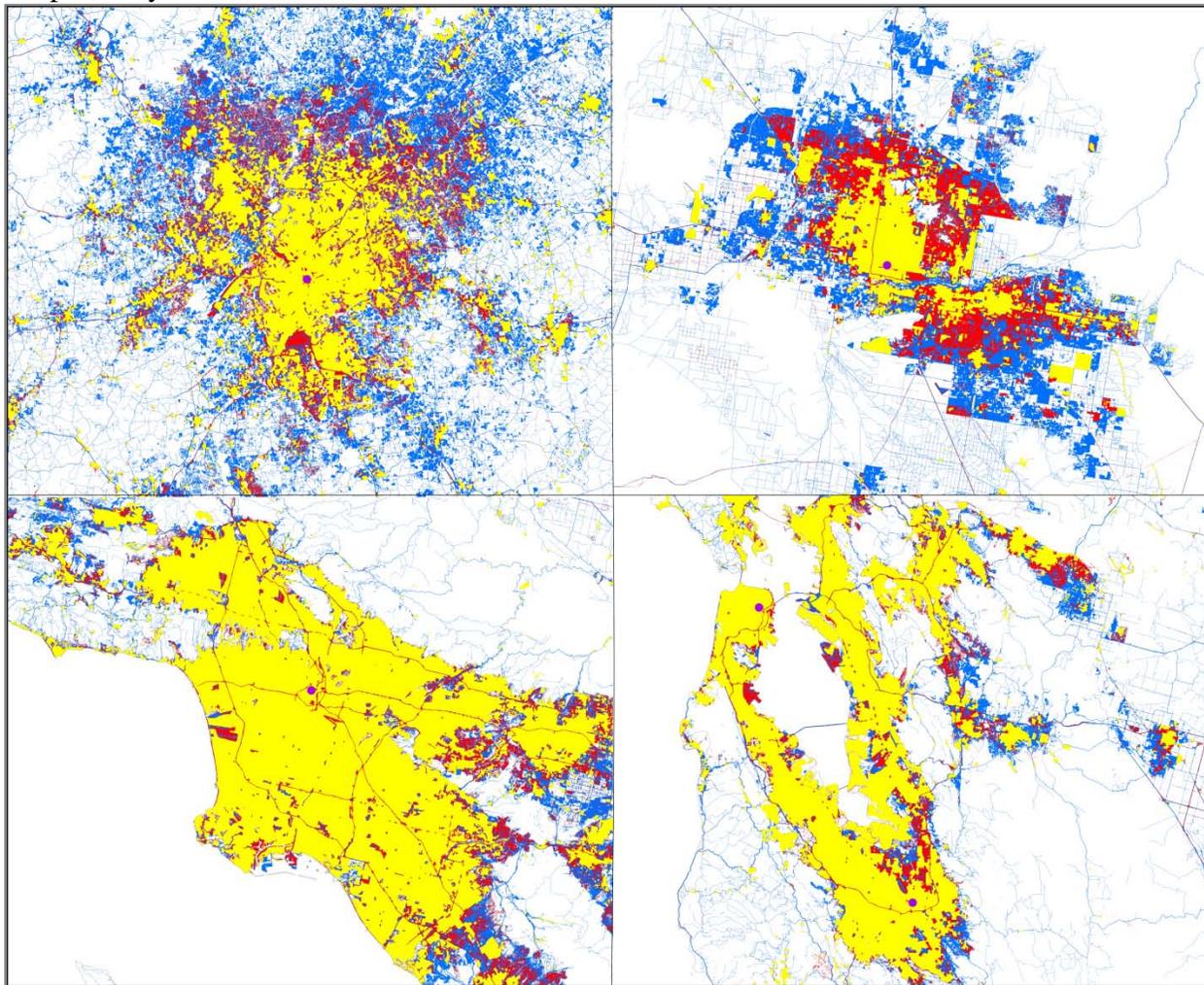
With this theoretical and empirical basis, we can expect residents in more constrained geographies (e.g. coastal cities like New York or Seattle) to experience higher and faster increases in home values than places which are flatter and landlocked (e.g. Atlanta or Charlotte). We would also expect constricted urban areas to remain relatively spatially contained, because of the inability to develop cheap marginal land due to the confluence of geography and regulatory regimes. This phenomenon is represented visually in Figure 3, which illustrates the spatial extent of urban development at approximately twenty year intervals from the mid-1970s in four major metropolitan areas. Los Angeles and San Francisco have very little post-1976 development on the periphery because of the Pacific ocean on one side and mountainous terrain on the other. Atlanta and Phoenix, on the other hand, have expanded tremendously over the past forty years because they lack these impediments to growth. These places also tend to have less strict regulatory measures, and enact less onerous rules restricting new development like that of their peers (Gyourko et al. 2008). It is no coincidence that Phoenix and Atlanta are relatively cheap housing markets, while Los Angeles and San Francisco are two of the most expensive in the country, with prices hovering around those in Manhattan. For our purposes, measures of geographic constraint present an opportunity to exploit the exogenous variation in marginal, unfettered, but buildable land in illustrating a causal link between home equity on the one hand, and college enrollment and related transfers on the other.

Data and Analytic Strategy

Dataset

Our data come from the PSID, a nationally representative, longitudinal study of families collected annually from 1968-1997, and biennially to the present (Panel Study of Income

Figure 3. Clockwise from top left: Atlanta metro, Phoenix metro, San Francisco Bay area, and Los Angeles basin. Yellow, red, and blue signify developed urban land in 1976, 1992, and 2011, respectively.



Dynamics 2016). Specifically, our dataset consists of the 2013 Rosters and Transfers module (hereafter RTM), a supplement of the PSID that collected information on intergenerational exchanges of time and money, which we merged with geocoded data from the main PSID survey. The latter includes variables pertaining to household characteristics (liquid wealth, home values, home equity, income, race of the head of household, size of household, age of head and children) from 1997 onward. We were able to match households to their geographic locations across waves, so as to produce estimates of the historical marginal land availability that we use as our exogenous instrument.

Because we are concerned primarily with children's educational attainment and related transfer activity, we compose a repeated cross section of 18- and 19-year-olds from 1997 to the present, similar to Lovenheim (2011). We then take measurements of our variables at this transition to college age in building models of transfers and attainment. We use post-1997 waves because of practicality (detailed housing and mortgage data are only available from 1997, and wealth consistently from wave to wave from 1999), and because developments like the removal of equity from aid calculations (1992) and the ease with which equity began to be tapped by consumers through cheaper processing and closing costs (from the late 1990s) coalesce with this period. Because we include controls for liquid wealth, only available from 1999 onward, our sample effectively consists of a repeated cross-section of 18- and 19-year-olds from 1999 up to the present, the money they received from parents for education in adulthood, their educational attainment measured in the most recent wave (2013), and merged data on their home environments and locations in the U.S. Our estimates are weighted using the most recent sampling weights to correct for attrition and oversampling in the original PSID study design.

(We use the most recent available weights because they correspond to households in the 2013 wave, which is when we measure transfers of money and attainment.)

Dependent Measures

We focus on two outcomes: intrafamily money transfers specifically intended for educational expenses, and college enrollment of children. For the former, we use a measure in the RTM which asks parents for the total amount of money given to each individual child since the age of 18 for "help paying for school, including tuition, room and board, and books" (PSID—Rosters and Transfers Parent/Child File 2016). Because this variable is right-skewed with a modal value of zero, we also produced estimates using logged values (which is not preferable because it either involves dropping zeroes or assigning arbitrarily small values to those observations) and General Method of Moments (GMM) specifications, which offered substantively similar results.

Because some related transfers may potentially not always be strictly labeled 'educational' as they only indirectly affect attendance (i.e. cash transfers for off-campus housing, or bridge money during job searches), we model total transfers of all kinds from 18 as a sensitivity check, and again obtain substantively similar results. For educational attainment, we measure enrollment using a variable in the RTM which asks parents how many years of education the child has completed at the time of the interview (2013) and construct a dichotomous variable indicating attendance/non-attendance. We code college enrollers as having >12 years of education, and include in our estimates only those who turned 18 prior to the 2013 wave to allow for lags between household graduation and college matriculation. Because this variable relies on parental recall, we also estimate models using years of education taken from the main PSID

survey, where responses come directly from the adult children. We again find similar results, suggesting that parents accurately report the educational attainment of their children in the RTM.

Independent Measures

Our independent variables of interest are home equity at t (when children are 18- or 19-years-old and transitioning into college or the labor market) and the prior four year growth in home equity. For families without mortgages that own their homes outright, we simply take the change in real home value at $t - 4$ for the latter, and the real value at t for the former. Households with mortgages are obviously less straightforward. Because the PSID includes a variable on whether the mortgage has been refinanced since the prior wave, we use this to differentiate households that obtained credit on the basis of their equity between waves. For homes that held the original mortgage, we subtract the difference in market value from the mortgage principal at t and $t - 4$ to obtain real equity at t and the change in equity over the prior four years. For homes that did refinance at some point, we construct a counterfactual estimate of what the growth in home equity would have been had the home not been refinanced, similar to the approach of Lovenheim (2011).

For the change in equity measure in the presence of a refinance or loan, our estimates are based on variables in the PSID available from 1996 onward which indicate the remaining mortgage principal at $t - 4$, the interest rate of the mortgage, and the remaining payment schedule. We use the following equation to estimate the mortgage principal at t had the household *not* refinanced in the four years preceding the onset of adulthood:

$$B = \frac{L[(1+c)^n - (1+c)^p]}{[(1+c)^n - 1]} \quad (1)$$

Where L is the principal at $t - 4$, c is the interest rate, n is the remaining number of payments in the schedule based on the homeowner's survey response at $t - 4$, p is the number of payments made (for our purposes, this equals 48), and B is the principal at t . This allows us to estimate the growth in equity had the terms of the loan remained the same over the preceding four years. We restrict the calculation of equity change and estimates of the effect of cross-sectional values of real equity to people who have not moved since two waves prior (from $t - 4$), so as to isolate households who had enough time to realize sizeable gains in their equity levels. For families who have variable-rate mortgages, this calculation will necessarily include some error if rates decreased or increased during the intervening four year period.

One concern is that equity levels at t may be biased by the very act of refinancing. (This is not an issue for our change of equity predictor, because that is specifically based on a no-refinance counterfactual.) That is, our results could be misleading as to the real effect of equity at the transition to adulthood on transfers or college enrollment, since homeowners likely extract value from it through refinancing precisely to attain the goals of increased transfers or enrolling their kids in college. We could then find, for example, that lower equity results in more transfers or enrollment, when this relationship is really driven by the availability of credit and consequent debt incurred and not a loss in equity due to a decline in the value of the home net controls, which would not make sense (unless perhaps the returns to college increased in a particularly dramatic fashion). When we restrict our analyses to households which did not refinance in the four years preceding adulthood, however, we obtain substantively similar results. We also obtain similar results using home values, change in home values, and the change in equity as predictors. This could be because parents use instruments like HELOCs, which are not as involved as cash-out refinancing but offer lines of credit that can be tapped when children do transition to college.

Or it could be that increases in equity provide a financial buffer for households which more readily enables them to use savings or even income streams to initiate cash transfers. Thus it could be that there is a more indirect line between equity gains and transfers, but one that would nevertheless fail to manifest without higher equity or faster appreciation. Finally, it is also possible that parents refinance *after* children turn 18 and enroll in college, as they may have a limited understanding of the costs involved in the period preceding, or as grants and other aid decrease after the first year of attendance.

We thus estimate real home equity at t and the change in real home equity in the four year period preceding adulthood for the households of 18- and 19-year-olds in our repeated cross section who remain in the same neighborhoods during the intervening years. We also include controls for the children's age in 2013 (when the transfers are reported), family income, total assets less the principal residence, the age of the head of household in 2013, the size of the family, whether the head is a college graduate, and the head's racial background (coded as either white or non-white). Because income trends are not always smooth, we also estimated a four year average of family income in the four years preceding t . Our results were unaffected using the 4-year average but resulted in more missing cases, so we use the snapshot measure to obtain more precise estimates.

Analytic Strategy

Our estimates will be biased if households that have greater home equity are systematically different in a way that also affects their transfers to children or their educational attainment. For instance, financially savvy parents may locate in areas with greater appreciation in home prices and simultaneously pass on both material (tuition money) and nonmaterial (skill or cognitive

ability) assets to their children that are valuable in the transition into adulthood but go unmeasured in the model. To address the endogeneity of home equity, we use the variation in marginal land availability in 1976 to instrument for our predictors of interest. We construct a measure of availability using data from the National Land Cover Database (2016), the United States Geological Survey (bulk data obtained directly from the government), and Land Use and Land Cover (2016) satellite imagery.

Similar to the approach of Saiz (2010), we construct a composite using Geographic Information Systems (GIS) to overlay land which is practically difficult or impossible to build on (steep slopes, wetlands, water bodies) and the extent of urban land cover in 1976. We estimate the amount of land which is developable and not urbanized in 1976 within buffered areas centered on CBDs and wholly circumscribed within either Metropolitan Statistical Areas (MSAs), Micropolitan Statistical Areas (similar to MSAs but less populous), and for areas which are outside of urban agglomerations, remaining counties. We obtained CBD geocodes made publicly available by Holian and Kahn (2012), and for counties use geographic centroids for constructing aerial buffers. For areas where no CBD information was available, we followed the method used by Holian and Kahn to obtain geocodes by obtaining latitudinal and longitudinal coordinates for employment centers using Google Earth.

We recognize that most MSAs do not contain only one employment center of interest, but are increasingly polycentric due to cheap transportation and the willingness of firms to relocate based on commercial rent and other factors. Still, subcenters will, all equal, benefit from being proximate to 'legacy' downtowns and other entrenched nodes of development like CBDs because of the benefits of urban agglomeration (Glaeser and Gottlieb 2009). In other words, U.S. metropolitan areas are increasingly polycentric, but still follow a general pattern of spatial

development based on the benefits of locating near the dominant or legacy CBD. Our implicit treatment of urbanized area in 1976 as difficult to develop (or redevelop) may also seem puzzling. After all, it seems intuitively straightforward that redeveloping areas with embedded infrastructure may be cheaper and easier for developers rather than constructing new communities in empty lots on the periphery.

Yet as Farris (2001) explains, infill development is actually more costly and involved than 'greenfield' construction (i.e. that which takes place in wholly undeveloped land, usually at the margins of an urban area) because of a litany of factors, which include adapting older infrastructure to new and more intensive uses, and the issues of zoning and regulation we discussed earlier in the paper. As Farris (2001) points out, the vast majority of new construction permits (estimated to be near 95% in his sample of large U.S. metros) issued in the U.S. are not for land which is already urbanized, but in places that have gone heretofore untouched. Including areas already urbanized in our land availability measure thus offers an estimate of untouched but developable and (theoretically) cheap land on the urban periphery, which we predict would systematically affect home prices through reductions in supply elasticity on a regional level.

In the first stage, we regress the endogenous variable of interest (equity at t and change in equity) on our exogenous measure of land availability and other covariates in the model:

$$X_i = \beta_0 + \beta_1 Z_i + \beta_2 K_i + \varepsilon_1 \quad (2)$$

Where Z is the instrumental variable, K is a suite of covariates, and ε is the error term. In the second stage, the parameter X_i^* —which represents the first stage effect of Z on X_i , adjusting for covariates—is then incorporated into the second stage equation which captures the effect of the instrumented endogenous variable on the outcome:

$$Y_i = \beta_0 + \beta_1 X_i^* + \beta_2 K_i + \varepsilon_2 \quad (3)$$

Our instrumental variable estimates will be biased if development constraints are not truly exogenous, and transfers and attainment are affected through a channel other than equity alone. There are a number of plausible pathways between geography and these outcomes of interest that do not involve the accumulation of housing wealth *per se*. Because U.S. public schools are funded most through property taxes, it could be that areas with high housing values systematically produce better educational outcomes for children through higher quality school instruction and related gains in cognitive ability. Estimates could also be biased through self-selection, if, for instance, parents that are more likely to gift tuition money systematically migrate to areas with a higher propensity to accumulate equity. Finally, aside from housing supply elasticity, building constraints also have wage effects (Saks 2008), which could result in more disposable income, higher *inter vivos* transfers, and consequent enrollment. While violations of the exclusion restriction are not directly empirically testable, we present evidence for the exogeneity of our instrument using a set of robustness checks in our results.

Results and Discussion

In Table 1, we show the relationship between real home values, equity, growth in equity, and *inter vivos* education transfers. Our IV results produce more robust associations with larger coefficients than the OLS specifications, which suggest that naive estimates may undervalue the effect of equity on giving. We find that a \$10,000 increase in home values, equity, and 4-year changes in equity before adulthood correspond to \$643, \$1,045, and \$6,547 more in educational transfers. This effect is substantial in a real-world sense because during the housing boom, it was not uncommon for homes to appreciate ~\$50,000 every 2-4 years. In our sample, the mean growth in equity in the preceding four years for households where the children reached 18 before

Table 1. The Effect of Home Values, Equity, and Equity Change on Educational Transfers (in thousands of dollars) in Adulthood

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Age	-4.732* (2.079)	-4.771* (2.125)	-3.444 (3.264)	-4.155* (1.617)	-3.618* (1.773)	-10.796 (7.762)
Income (\$10,000)	0.145 (0.119)	0.291† (0.168)	-0.007 (0.124)	-0.006 (0.183)	-0.055 (0.214)	-0.708 (0.574)
Liquid wealth (\$100K)	0.079 (0.121)	0.074 (0.136)	0.054 (0.049)	0.066 (0.088)	-0.085 (0.076)	-0.217† (0.121)
Age of head	0.297 (0.288)	0.257 (0.271)	0.614 (0.374)	0.201 (0.206)	-0.103 (0.256)	-0.150 (0.506)
Size of family	-1.729* (0.813)	-1.570* (0.784)	-2.280 (1.443)	-1.249* (0.608)	-0.723 (0.506)	-1.750 (1.450)
Head college	12.733*** (3.304)	14.179*** (3.118)	19.679 (4.186)***	11.199*** (2.308)	12.390*** (1.985)	22.175*** (5.965)
Race	5.779* (2.644)	6.828* (2.866)	11.875 (5.787)*	4.058** (1.390)	2.409† (1.373)	8.112 (6.422)
Home value (\$10,000)	0.364** (0.124)	—	—	0.643** (0.201)	—	—
Equity (\$10,000)	—	0.241** (0.087)	—	—	1.045*** (0.271)	—
Equity Δ (\$10,000)	—	—	0.591 (0.227)*	—	—	6.547* (2.577)
Constant	149.987 (62.784)	150.555* (65.116)	42.807 (59.979)	67.805* (28.598)	73.513* (29.956)	262.856 (171.640)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Place FE	Yes	Yes	Yes	No	No	No
First Stage F	—	—	—	40.34	20.20	8.49
N	2185	2185	1074	2185	2185	1074

NOTE: Robust standard errors in parentheses (clustered at Metro, Micro, or county level).

*** $p < .001$ ** $p < .01$ * $p < .05$ † $p < .1$

2009 (and thus have their housing wealth measured before the crash) was approximately \$52,600.

To offer real world examples, we estimate that a family with \$100,000 in home equity gives over \$9,200 to their children for education expenses, while those with \$50,000 equity give just under \$3,000, as predicted by the model. Families that saw a \$50,000 gain in equity over the four years preceding their children transitioning to adulthood give about \$26,500 in such transfers, compared to just over \$10,000 for families with only half those equity gains. This is highly unlikely to be due to differences in the family's EFC alone. We estimate using financial aid formulas that for a household with two parents, one college aged adult, and one younger sibling that earns \$80,000 in income (about the median family level) would have an institutional EFC (that is, the proprietary formula schools use when they incorporate equity into their calculations) only \$1,500 less if they had \$50,000 as opposed to \$100,000 in equity (\$8,552 vs. \$9,957 EFC, respectively). That is, the influence of equity on giving is much more robust than its relationship to EFC, which makes it doubtful that giving is purely a response to EFC. And for children attending schools that use the FAFSA, equity wouldn't factor into their EFC at all.

Our first stage results illustrate that geography is a strong instrument for housing cost and equity, but exhibits a weaker relationship with the growth in equity (though the F statistic is not so far below 10, a commonly used threshold for gauging the strength of instruments, that we would wholly discredit the estimates). This is likely because during the housing boom, intercity differences in equity growth were likely smaller than long-run intercity differences because of a 'rising tide' effect of the housing boom. In Table 2, we present our results on the effect of home values, equity, and equity change on whether children enrolled in college. Here, we find a null effect of values and equity on the likelihood of college enrollment, but a relatively strong effect

Table 2. The Effect of Home Values, Equity, and Equity Change on College Enrollment

	Probit			IV Probit		
	(1)	(2)	(3)	(4)	(5)	(6)
Age	-0.003 (0.081)	-0.005 (0.082)	-0.049 (0.131)	-0.025 (0.064)	-0.018 (0.065)	-0.080 (0.112)
Income (\$10,000)	0.016 (0.010)	0.022* (0.010)	0.018 (0.013)	0.028* (0.012)	0.028* (0.013)	0.009 (0.016)
Liquid wealth (\$100K)	-0.011*** (0.001)	-0.012*** (0.002)	-0.010*** (0.002)	-0.009*** (0.002)	-0.012*** (0.003)	-0.010** (0.003)
Age of head	0.029** (0.010)	0.026** (0.010)	0.036* (0.016)	0.017* (0.008)	0.012 (0.009)	0.001 (0.010)
Size of family	0.046 (0.036)	0.056 (0.036)	0.039 (0.050)	0.048† (0.025)	0.058* (0.025)	0.014 (0.030)
Head college	0.627*** (0.128)	0.680*** (0.127)	0.716*** (0.182)	0.634*** (0.108)	0.648*** (0.105)	0.496*** (0.142)
Race	0.281* (0.132)	0.312* (0.132)	0.396* (0.193)	0.200† (0.105)	0.171 (0.109)	0.158 (0.129)
Home value (\$10,000)	0.018** (0.006)	—	—	0.012 (0.008)	—	—
Equity (\$10,000)	—	0.015* (0.006)	—	—	0.019 (0.012)	—
Equity Δ (\$10,000)	—	—	0.004 (0.005)	—	—	0.073** (0.023)
Constant	3.580* (1.684)	3.651* (1.719)	-1.375 (2.892)	-0.833 (1.326)	-0.714 (1.345)	1.980 (2.481)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Place FE	Yes	Yes	Yes	No	No	No
First Stage F	—	—	—	44.65	21.60	7.40
N	1972	1972	872	2270	2270	1125

NOTE: Robust standard errors in parentheses (clustered at Metro, Micro, or county level).

*** $p < .001$ ** $p < .01$ * $p < .05$ † $p < .1$

of the growth in equity. This would lend some support to the notion that total equity holdings at 18 or 19 allow for more intrafamily transfers, but among children who would be attending school regardless. Yet the growth in equity has a strong positive effect on enrollment, which suggests that more robust appreciation in home prices (and consequent gains in equity levels during the high school years) could promote enrollment levels for many students. Still, we take caution when interpreting the effect of equity growth on enrollment because of the first-stage statistics compared to the other models.

We next conduct a series of robustness checks to address the exogeneity of our instrument. First, we compare the effect of housing on transfers and enrollment for owners compared to renters. We constructed a time series of county-level median home values using census data, interpolating figures for intercensal periods before the American Community Survey (ACS) was introduced in 2006, for each wave in our sample. We then instrumented county level median home values with our measure of developable land. We would have reason to suspect that transfers or enrollment were operating through channels other than equity or equity gains if we saw a similar effect with renters, possibly through increased property taxes and better services, which would in theory benefit everyone equally. We find that county home values have a strong effect on transfers ($p < .01$) for homeowners, but are insignificant at $p < .05$ for renters. For neither renters nor owners did county home values exhibit significant effects on enrollment.

Next, we address the possibility that PSID families who are more likely to give money or have college-bound children systematically sort into places with robust growth in home prices, which increases their gains. We take an approach similar to Lovenheim (2011) and assign the descendants in our sample to the places where the original households in the initial 1968 wave lived. We then assigned current county-level home values based on these places where the

households our sample heads descended from lived in 1968. So if a sample family lived in Manhattan in 2005, but their head of household descended from a family that originally lived in Kansas City in 1968, we assign them the wave-specific home values for Kansas City. If these 'place of origin' home values were not significantly predictive of transfers or enrollment, we would have cause for concern our results were biased due to migratory patterns. Our results indicate that for both transfers and enrollment, 'origin' home values are significant predictors, with even larger coefficients than current-county prices. We also run models which restrict the sample to only those families who remained in the same counties as their 1968 PSID ancestors. Again, we see substantively similar results for these 'non-movers.' These results suggest that our results are not driven by families who are systematically relocating to areas with greater home appreciation.

In Table 3, we present results stratified by wealth (using \$15,000 in liquid assets as our cut point, which is the approximate median level of non-housing wealth in our sample), race, and pre- and post-recession (using 2007 and before to indicate the former, and post-2007 to indicate the latter). While we interpret these figures with some caution because of the loss of precision when restricting our sample to subgroups, we find that the effect of equity is mostly concentrated among white families with less liquid wealth and no appreciable differences between pre- and post-recession periods. Our results are similar for the growth in equity, though here, perhaps unsurprisingly, only the pre-recession period sees an effect on transfers. We do see an effect of equity on transfers for nonwhite children, but only at the $p < .1$ level. For enrollment, we find no significant effect of equity at t on enrollment, except again for nonwhite families at $p < .1$. The change in equity, however, is significantly associated with enrollment for wealthier white families. This suggests that growth in equity may spur wealthier children who are on the margins

Table 3. Results stratified by wealth, race, and pre- and post-recession era.

	Dependent Variable: Transfers					
	>15k Wealth	<15k Wealth	White	Nonwhite	Pre-recession	Post-recession
	(1)	(2)	(3)	(4)	(5)	(6)
Equity (\$10,000)	0.663*	1.040***	1.036***	1.258†	0.997**	0.920**
	(0.283)	(0.291)	(0.293)	(0.748)	(0.316)	(0.286)
Controls/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
First stage F	24.60	17.80	18.57	6.84	17.78	9.41
<i>N</i>	696	1489	1420	765	1512	689
Equity Δ (\$10,000)	3.364	6.546**	6.633*	10.196	3.315**	-4.153
	(7.283)	(2.456)	(2.634)	(12.100)	(1.008)	(3.062)
Controls/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
First stage F	0.37	9.57	8.54	0.65	16.56	2.62
<i>N</i>	289	785	763	311	659	415
	Dependent Variable: College enrollment					
Equity (\$10,000)	0.012	0.039	0.015	0.067†	0.020	0.017
	(0.013)	(0.030)	(0.012)	(0.038)	(0.014)	(0.013)
Controls/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
First stage F	19.60	21.94	19.90	6.93	19.86	11.92
<i>N</i>	1550	720	1471	799	1560	710
Equity Δ (\$10,000)	0.066**	0.115	0.077**	0.075	0.051†	-0.043
	(0.022)	(0.101)	(0.023)	(0.077)	(0.028)	(0.049)
Controls/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
First stage F	7.31	2.06	5.72	3.31	13.56	2.86
<i>N</i>	821	304	796	329	687	438

NOTE: Robust standard errors in parentheses (clustered at Metro, Micro, or county level).

*** $p < .001$ ** $p < .01$ * $p < .05$ † $p < .1$

of college attendance to enroll net other household factors. They also suggest that total equity may be a crucial resource for less wealthy white children in particular.

Our race-stratified results are consistent with recent research. For instance, Addo (2016) finds that young black adults have higher debt burdens than their white counterparts, and this partly results from less intrafamily transfers even for wealthier black families. Fox (forthcoming) finds that for low-income black families, home equity exhibits a *negative* association with income mobility. And McKernan et al. (2014) finds that lower intrafamily transfers explain about 12% of the race gap in wealth. Why would nonwhite families (who in our sample are predominantly African American) not exhibit a significant effect of equity on transfers like their white peers? One possibility is that because nonwhites have much lower levels of equity and experience less growth in equity (both are about half of the value of white families, in our sample), they do not reach a threshold where they can realistically capture liquidity, or are more averse to borrowing because they have a smaller reservoir of housing wealth.

Another possibility is that housing wealth is more difficult to exploit in practice for nonwhites because of the persistence of discrimination in lending. Studies using either secondary data or audits find that Blacks are routinely more likely to be offered loans at higher rates or given otherwise unfavorable terms compared to their white peers, for instance (Pager and Shepherd 2008: 190). Though the incidence of subprime lending before the recession is a particularly glaring example of these kinds of practices, this could extend to efforts to refinance or obtain HELOCs which could be used when children transition to college. A confluence of less housing wealth, less appreciation over time, and discrimination in lending would unsurprisingly lead to a null effect of equity on transfers or attendance.

Our findings with respect to white families suggest that less wealthy parents may use their home equity as a valuable resource in financing education. When we stratify by income rather than wealth, however, we get a more complicated picture—the effect of equity on transfers and equity growth on enrollment is concentrated among families earning six figures, with no effect for poorer families. Thus while white families that benefit from their home equity may have low levels of liquid wealth, they also are relatively affluent in terms of their income streams. We also stratified results based on the developability measure, using 50% developable marginal land as the cut point (which is about the mean figure). We find that equity effects are, unsurprisingly, concentrated among those who live in more geographically constrained areas. Thus while equity appears to have an effect on transfers, and equity growth on enrollment, the children benefiting are primarily more affluent in terms of income if not liquid wealth, white, and living in coastal areas where home values are higher.

Conclusion

Does home equity have a causal effect on *inter vivos* education transfers and college enrollment? We exploit the exogenous variation in marginal land availability in trying to isolate a causal channel between housing wealth and these outcomes, and find that equity does indeed have significant effects, if in different forms (i.e. total equity or growth in equity), and concentrated among select subpopulations. In contrast to Lovenheim (2011), we find that these effects are mainly concentrated among students who are unlikely to be credit constrained. This is probably due to our choice of instruments and model specification. As shortfalls between the total costs of attendance and institutional support increase and student debt levels soar to new heights, family transfers make up a vital mechanism for bridging these gaps for children.

In terms of how equity relates to enrollment, we see that short-run growth but not total housing wealth exhibits a significant effect. This makes some intuitive sense, and is broadly consistent with the findings of Loke (2013) that children can effectively 'catch up' with their wealthier peers through relatively quick accumulation. That is, total equity may not result in increased enrollment because it may only be families that are on the margins who quickly accumulate housing wealth (but do not necessarily exhibit large totals) that translate these gains into college attendance. It may also be the case that the types of schools students attend can explain some of our results. That is, at least in terms of transfers, families with more equity may give more because their children are accepted to more prestigious programs and have systematically higher costs of attendance. Future research could refine or build on our models and explore what kinds of institutions children attend, offering a more detailed portrait on exactly the kinds of programs children enroll in and how this may drive their costs. Still, because equity does not dramatically alter the EFC (and indeed for many schools is a non factor), which is the primary determinant of the final cost of attendance, we feel what we are measuring is likely not driven totally by institutional quality.

Here, we show that while equity is an important resource for some, others are either unwilling or unable to exploit their housing resources in the service of transferring money. Further, equity appears to have no appreciable effect on enrollment for most. Future research could focus on whether this is based on preferences like risk aversion, or if it is a more insidious byproduct of credit market discrimination which puts those who are already at a disadvantage further into debt to pay for school. Since the housing crash reduced the levels of total equity and turned many equity changes from large and positive to negative, we may also suspect this has implications on how much debt students had to take on when this resource was taken away in

part or in whole after 2007. With future waves of the PSID, we can better examine the long-run effects of this unprecedented loss in home values for students transitioning during the Great Recession.

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