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# Housing Wealth and Higher Education:

## Building a Foundation for Economic Mobility



DECEMBER 2011

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By forging a broad and nonpartisan agreement on the facts, figures and trends related to mobility, the Economic Mobility Project is generating an active policy debate about how best to improve economic opportunity in the United States and to ensure that the American Dream is kept alive for generations that follow.

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This report is intended for educational and informational purposes.

For additional information on The Pew Charitable Trusts and the Economic Mobility Project, please visit [www.economicmobility.org](http://www.economicmobility.org) or email us at [info@economicmobility.org](mailto:info@economicmobility.org).

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# Executive Summary

A college degree often translates into economic success: Americans who start at the bottom of the income ladder *quadruple* their chances of making it to the top when they earn a four-year degree, according to past research by the Pew Economic Mobility Project. Nevertheless, many young people from the bottom and middle of the ladder never enroll in some form of postsecondary education, or do not graduate if they do. The question is, why?

There are two primary explanations at the individual level: college costs and academic preparation. These two drivers are not mutually exclusive. Families who have less money to send their children to college also have fewer resources to invest in pre-college education. Many external factors outside of a family's control also influence postsecondary decisions. For example, students consider the availability of jobs and financial aid when deciding whether to pursue higher education.

In a time of increased financial hardship, however, it is important to better understand how family wealth, independent of other factors, affects

students' decisions about higher education. The purpose of this study, *Housing Wealth and Higher Education: Building a Foundation for Economic Mobility*, was to develop an economic model that isolates the impact that family wealth has on college choices.

The recent housing boom and bust provided a unique opportunity to conduct this research. When housing prices were on a seemingly endless upward climb, many families experienced historically large wealth gains. When housing prices crashed, the wealth of many households evaporated. Because housing has been the primary source of wealth for most low- and middle-income families, changes in home equity have a significant influence on total family assets.

Since the boom occurred in different locations at different times, the author was able to develop a model that used variation in home equity as a natural experiment.<sup>1</sup> The model investigates whether changes in family wealth, as represented by gains in home equity, affected college decisions. The approach controls for a range of time-related, geographic, and individual

and family background factors that might also contribute to postsecondary choices so that the relationship between housing wealth and college enrollment, selection, and completion rates alone can be estimated.<sup>2</sup>

*Housing Wealth and Higher Education: Building a Foundation for Economic Mobility* demonstrates that higher education decisions are highly sensitive to fluctuations in family resources. The model shows that low- and middle-income students whose families experienced increases in housing wealth just before reaching college age were more likely to attend college, more likely to attend higher-quality universities, and more likely to graduate.

The report's key findings include:

**Students from low- and middle-income families were much more likely to enroll in college when their families experienced gains in housing wealth.**

- For every \$10,000 of home equity gains, the likelihood of enrolling in college increased by 6 percentage points among families with incomes below \$70,000.
- The wealth generated by rising home values is estimated to have increased college enrollment by 24 percent among low- and middle-income families during the housing boom. Without gains in home equity, just

37 percent of these families' children would have enrolled, rather than 46 percent.

- There is little evidence that wealth gains affected college enrollment among families with incomes of \$70,000 or more, or that they affected families of any income in earlier decades when housing equity was less liquid.

**Students from low- and middle-income families were more likely to select higher-quality schools, and were more likely to graduate with a four-year degree, when their families experienced gains in housing wealth.**

- Among students coming from families earning less than \$70,000 a year, the housing boom increased enrollment in four-year public flagship schools by 24 percent and reduced enrollment in community colleges by 17 percent.<sup>3</sup>
- Increased housing wealth raised the likelihood of college graduation by 9 percent, compared to what it would have been without the housing boom, among low- and middle-income students, lifting it to 32 percent.

**This analysis suggests that the recent housing bust and resulting decrease in wealth could negatively impact the postsecondary decisions of low- and middle-income families.**

## EXECUTIVE SUMMARY

- Home equity is estimated to have declined by 54 percent between 2006 and 2010 for homeowners with income less than \$70,000 per year.
- Absent other changes in the economy that affect college decisions, the report suggests that the decrease in housing wealth alone would have reduced college enrollment for students from these families by 30 percent. It also would have decreased enrollment in four-year public flagship schools by 26 percent and increased community college attendance by 29 percent among college-goers from these families.<sup>4</sup>
- Similarly, absent other changes in the economy, the housing bust alone would have reduced four-year college graduation rates by 12 percent for students from families making less than \$70,000 a year.

# Introduction

Education in general, and higher education in particular, is one of the major determinants of economic mobility in the United States. Past Economic Mobility Project (EMP) research has shown that Americans who start at the bottom of the income ladder are four times as likely to make it to the top when they earn a four-year degree.<sup>5</sup> Over the past several decades, the importance of higher education for economic mobility has only increased as the United States economy has become more skill-intensive.<sup>6</sup>

Despite the large and growing benefits of investing in higher education, increases in college enrollment and graduation have been sluggish. This has been particularly pronounced for students from low-income households, and educational attainment gaps across the income distribution have grown over time. The children of low-income families are much less likely to go to college than those from wealthier families, and attendees from low-income families are more likely to enroll in less-selective four-year schools and in community colleges, where per-student resources are significantly lower. There is

growing evidence that students at colleges with lower resources are less likely to graduate and take more time to graduate if they do complete a degree.<sup>7</sup>

One of the more compelling explanations for these gaps is that the high and growing cost of college prohibits lower-resource families from investing in postsecondary education for their children: Between 1981 and 2009, the cost of tuition increased by 125 percent at public four-year schools, by 138 percent at private four-year universities, and by 151 percent at community colleges.<sup>8</sup> However, because family resources are correlated with the academic preparation of students, determining the causal role family resources play in higher-education decisions is difficult. Low-income families also have fewer resources for pre-college education, which reduces their children's opportunities for postsecondary access and success.

Isolating the impact of college affordability on postsecondary education— independent of academic preparation— has important implications for policy



makers striving to increase college enrollment and graduation rates across the income distribution. To this end, this report uses variation in family resources generated by the recent housing boom as a natural experiment to investigate the role that family wealth plays in higher education decisions.

Housing wealth is an ideal asset on which to focus in assessing the basic question of how important family financial resources are for postsecondary education for two reasons. First, particularly for low- and middle-income families, their home is their primary source of wealth. For example, in 2004, 48 percent of homeowners had less than \$10,000 in non-housing, non-IRA savings, and among homeowners with less than \$70,000 in family income, median savings was \$6,000. However, median home equity among these households was \$80,000.<sup>9</sup>

Second, the past decade was characterized by unprecedented volatility in housing prices. Between 2000 and 2006, home prices increased by 55 percent nationally, whereas between 2006 and 2010, home prices declined by 35 percent.<sup>10</sup> Housing wealth also became more liquid during the boom due to changes in the mortgage industry that made it easier to extract equity from homes, for instance through home equity lines of credit. This caused variation in home prices to affect

significantly the liquid wealth of many households. Variation in home prices generated by the housing boom can thus be used to generate variation in family resources unrelated to students' college preparation or other confounding factors.

This report finds that students whose families experienced increases in housing wealth just before reaching college age were more likely to attend college, were more likely to attend higher-quality universities and, for students from low- and middle-income families, were more likely to graduate. In general, the effects of additional wealth were concentrated among low- and middle-income students.

Certainly, the specific circumstances of the nation's recent housing boom are unlikely to recur, and the focus of this report is not the relative merits of homeownership as a wealth-building strategy. Rather, the results yield insight into the broader question of how financial constraints among families with college-age children affect the postsecondary decisions of these students, and what role wealth plays in alleviating these constraints. The report's findings suggest the importance of supporting broad asset building among low- and middle-income families, providing low- and middle-income students with better access to financial supports to help pay for college and focusing on increasing college completion rates.

# Income-Based Disparities in College-Going

## Education, the College Wage Premium and Economic Mobility

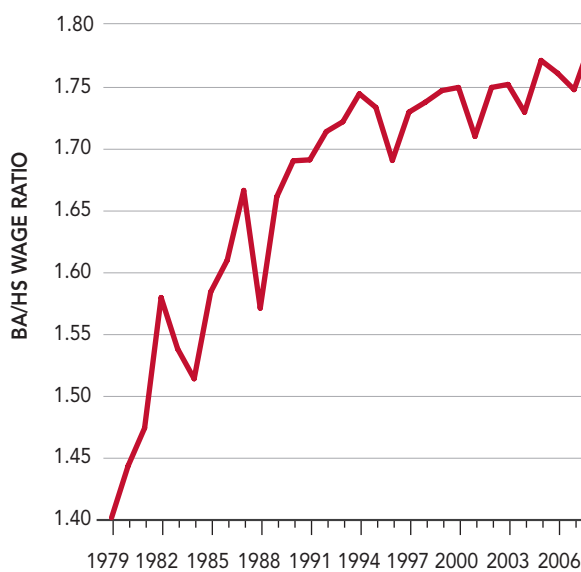
Although it is no surprise that those with a college education earn more than those with only a high school diploma, this disparity has risen dramatically since the late 1970s. Figure 1 shows the ratio of hourly wages of those with a college degree to those with only a high school diploma, yearly from 1979 to 2008.<sup>11</sup> The college wage premium almost doubled over this period (from 40 percent higher wages than a high school graduate to nearly 80 percent), and the benefits of a college degree have continued to rise since the 1970s. As the demand for skilled labor continues to increase in the United States, there is reason to believe this trend will continue for the foreseeable future.

The rising college wage premium drives the importance of education for economic mobility. Earning a four-year degree quadruples the chances that a child who starts at the bottom of the income ladder will rise all the way to the top (increasing the likelihood from 5 to 19 percent).<sup>12</sup>

Figure 1

### Hourly Wage Ratio of Workers With a Bachelor's Degree to Those with a High School Diploma

Four-year college graduates earn nearly twice as much per hour as those without education beyond high school.



SOURCE: Author's computations using the Current Population Survey Merged Outgoing Rotation Group Files.

Without a college degree, nearly half (45 percent) of children starting at the bottom remain there as adults (versus 16 percent of those who get a college degree).<sup>13</sup>

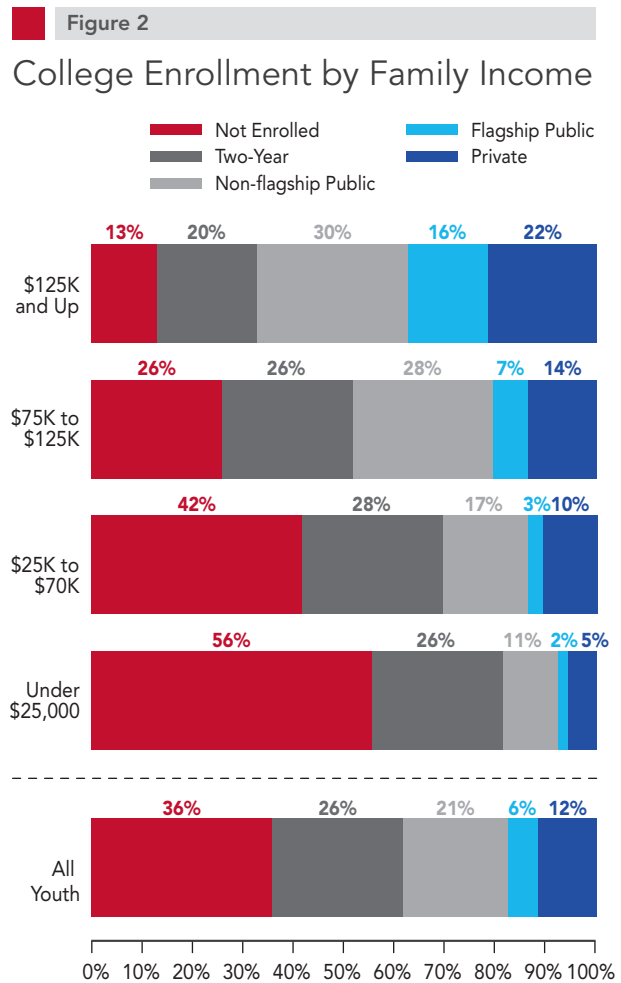
Yet despite the large and growing wage benefits from investing in higher

education, college enrollment has not increased at a similar pace. Since 1979, the college enrollment rate among high school graduates increased by just 35 percent, even though the college wage premium almost doubled.<sup>14</sup> Since 1990, enrollment increased by only 8 percent, at a time in which the wages of college graduates were still growing relative to those of high school graduates, as shown in Figure 1. The fact that college completion has not kept pace with the growing disparity in earnings between high school and college graduates highlights the need to understand who is going to college and the barriers low-income students in particular might face in obtaining a degree.

### Educational Attainment by Income

The low response of college enrollment rates to the college wage premium is most pronounced among lower-income families. This point is underscored by the large differences across the income distribution in college investment, illustrated in Figure 2.

For the purpose of this study, colleges are categorized into four distinct groups: flagship public four-year, non-flagship public four-year, private four-year and two-year. Flagship public universities are each state’s elite public institution (or multiple institutions as in the case of California, Texas and New York). Examples of flagship universities are the



SOURCE: Author’s computations using the National Longitudinal Survey of Youth, 1997.

NOTE: Incomes are in 2007 dollars. Bars may not add to 100 percent due to rounding.

University of Michigan, the University of Virginia and the University of Colorado at Boulder. These universities have more resources than other public colleges in each state, attract more academically advanced students and have much more favorable academic outcomes among their student bodies.<sup>15</sup>

Among families earning less than \$25,000 per year, 44 percent of their college-age children enroll in college. Among them,

59 percent attend a community college and only 4 percent attend a flagship public four-year school and 12 percent attend a private four-year university. However, for households with incomes of more than \$125,000 per year, the college enrollment rate is 87 percent. Among attendees, 23 percent choose a community college, whereas 19 percent attend a flagship public four-year university and 25 percent attend a private four-year college.

As Figure 2 demonstrates, the likelihood of enrolling in a two-year school drops precipitously with higher family income, whereas enrollment in elite public schools and in private universities increases substantially with income. While 38 percent of children from the highest income group enroll in a private or flagship public college, 7 percent of those from the lowest income group do. The fact that students from higher-income households invest more in postsecondary education and are more likely to attend higher-resource universities, where graduation rates are better and students tend to earn more post-graduation, is likely to reduce economic mobility across generations. In other words, higher-income students who enroll in college are more likely to remain higher income, and low-income students who do not invest in postsecondary education are more likely to remain low-income.

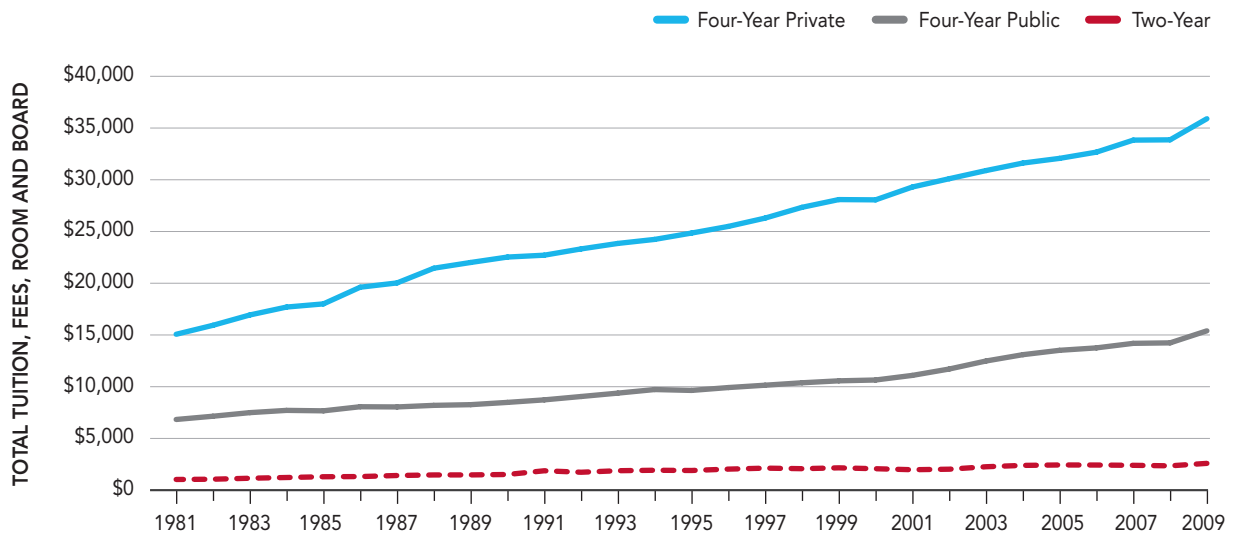
The correspondingly large differences across the income distribution in college completion reinforce this conclusion. Among college attendees from families with incomes less than \$70,000 per year, 28 percent obtain a four-year degree. For students from families with yearly income more than \$125,000 per year, 60 percent earn such a degree. Thus, lower-income students invest in lower-quality colleges and universities, on average, and experience lower graduation rates. This report explores whether these differences in student choices and outcomes by income are causally related.

## Possible Reasons for the Income Gap in College-Going and Completion

The core theoretical explanations for lower college investment among low-income households take two forms. The first is that these families lack the resources necessary to finance a college education, particularly in light of the high and rising cost of college enrollment. Figure 3 shows tuition, fees, and room and board charges by institution type from 1981 through 2009. For both four-year sectors, college attendance costs have risen by over 125 percent. While the increases in costs are relatively constant in the private sector, in the public sector the cost increases have been steeper since 2001. Even among two-year schools, costs have increased by more

Figure 3

Trends in Real Tuition, Fees, Room and Board by College Type



SOURCE: College Board (2010).

NOTE: Amounts are in 2010 dollars.

than 150 percent over this time period, although the overall expense is much lower than in four-year universities. While few students actually pay the full listed tuition because of financial aid, most of which comes from the federal government through tools like Pell Grants, the generosity of federal aid has been falling relative to tuition costs over this period. The complexity and underutilization of the financial aid system exacerbate the problem.<sup>16</sup>

The second explanation for the gap in postsecondary enrollment between income groups is that students from lower-income households are less academically prepared for college than are their peers

from wealthier backgrounds.<sup>17</sup> Such differences can develop because students whose families have fewer resources when they are of college age likely had fewer resources throughout their lives with which to invest in education. Whatever the reason for disparities in educational investment throughout childhood, this view argues such disparities are reflected in the level of college preparedness in early adulthood.<sup>18</sup>

The underlying explanations for income differences in college enrollment are not mutually exclusive: Students from lower-income families might be less academically qualified for college upon finishing high school and could face barriers to financing

their preferred choice of higher education. Identifying how important each factor is individually to the college investment decision is crucial to developing public policies to address the postsecondary education gap by income.

While much research has been done on the role family financial constraints play in college enrollment differences by income, previous work has not fully resolved the *causal* connection between

family resources and college attendance decisions. This lack of a resolution is primarily because it is difficult to disentangle the competing explanations for the strong correlation between family income and postsecondary investment. Furthermore, nearly all past analyses have focused exclusively on family income. But if other household resources, such as housing wealth, affect the college-going decision, the extent of financial constraints could be mischaracterized.

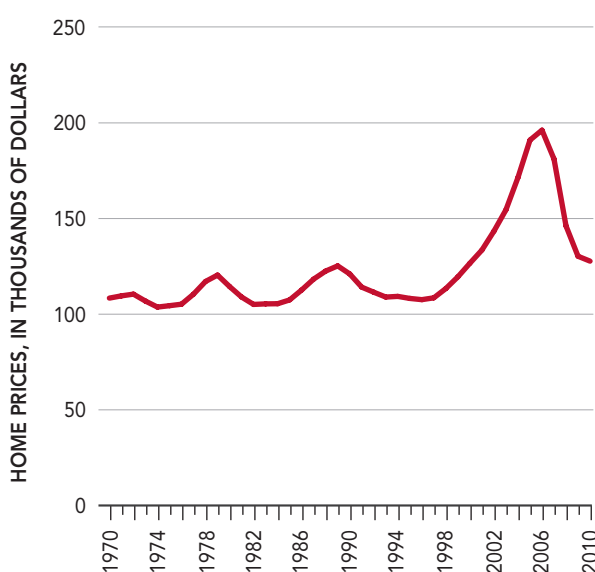
# Trends in Housing Wealth

The rise in college costs over the past decade coincided with historically high volatility in the housing market. Figure 4 shows average real home prices in the United States since 1970. Before the late 1990s, there was little variation in aggregate home prices. However, from 1998 to 2006, home prices increased by 173 percent, and then from 2006 through 2010 declined by 35 percent. These large changes were unprecedented in recent history, and they significantly affected household finances. Such effects likely were much larger for relatively low-income homeowners, who tend to have few assets aside from their home. For them, variation in home prices causes large fluctuations in total wealth.

In addition to growth in home prices, the housing boom was characterized by an increased liquidity of home equity. Around the turn of the century, changes in the mortgage industry made it much simpler and cheaper for households to extract the equity from their homes using financial instruments such as cash-out refinances, home equity loans and home equity lines of credit. Therefore, at the same time homeowners' assets expanded

Figure 4

Historical Real Home Price Trend



SOURCE: Shiller (2010).

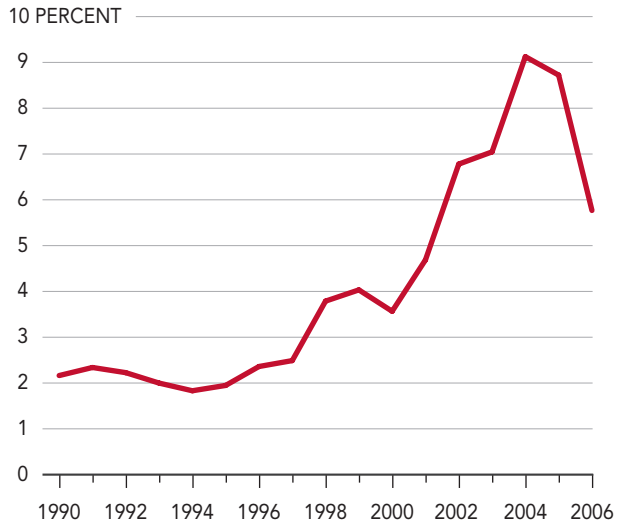
in value, they also became much easier to use to finance consumption and investment.

Figure 5 shows extracted home equity in each year as a percent of total personal income. As the figure demonstrates, in 1990, home equity extraction was 2 percent of income, while in 2004, it was 9 percent, an increase of more than 320 percent. The increase was concentrated

from the late 1990s to the early 2000s. Equity extraction then declined between 2004 and 2006 by 37 percent as the housing market began to drop. This decline has deepened in recent years as obtaining a home equity loan has become increasingly difficult.<sup>19</sup>

Figure 5

Home Equity Extraction as a Percentage of Personal Income



SOURCE: Greenspan and Kennedy (2007).



# How Important is Family Wealth for College Enrollment?

The dramatic changes in the housing market caused significant increases in liquid wealth, especially for lower-income families that owned a home. By comparing the college attendance decisions of students from otherwise identical households, but who happened to come of college age in cities and time periods that led to more or less housing wealth, this report identifies how family resources impact postsecondary education decisions.<sup>20</sup>

## Data and Methods

The data used to analyze college enrollment come from the Panel Study of Income Dynamics (PSID), which began following a nationally representative set of families in 1968. Members of the original sample and their descendants have been interviewed continually since that time. Key to this study is that the PSID contains detailed questions regarding household finances, home ownership and home prices that indicate how each family's housing wealth changes over time. The analyses are confined to young adults who were 18 or 19 years old between 2001 and 2005.<sup>21</sup>

Estimating the causal effect of housing wealth on college enrollment is complicated by the fact that families with such assets have children who are more likely to go to college due to unobserved attributes, such as preferences for education or student academic achievement. These analyses seek to isolate the effect of housing wealth on college attendance that is independent of these other potentially confounding factors.

To do so, the analyses use the change in families' housing wealth over the four years before college decision-making (roughly, the years the youth is in high school) to predict housing wealth *at* the time the choices are made. Then the impact of predicted housing wealth on college-going is assessed.<sup>22</sup> This approach accounts for a range of time-related, geographic, and individual and family background factors that might also contribute to the college-going decision so that the relationship between housing wealth and college enrollment alone can be measured.<sup>23</sup>

The methodology uses the fact that the timing and strength of the housing boom

differed across cities over time, and it compares the college-going behavior of otherwise identical individuals whose families have different housing wealth because they came of college age at different times with respect to their cities' housing boom. The analyses are restricted to families that did not move across cities, meaning that the results cannot be driven by those who moved to take advantage of home-price growth in order to be able to better afford a college education for their children. In that case, unobserved attributes of families might be behind the housing wealth/college-going relationship.<sup>24</sup>

Complicating this research strategy is the fact that if families liquidate their housing wealth to finance a college education, those with students who enroll in college will have less housing equity than otherwise identical households with children who do not enroll. Thus, it will appear as if youth from *lower*-wealth families are more likely to attend college, because those households that tap their home equity to pay for college have lower home equity growth than those whose children do not go to college. To account for this complication, instead of using actual change in housing wealth to predict housing wealth at the time of college-going, the estimated change in wealth *with no home equity extracted* over the prior four years is used.<sup>25</sup>

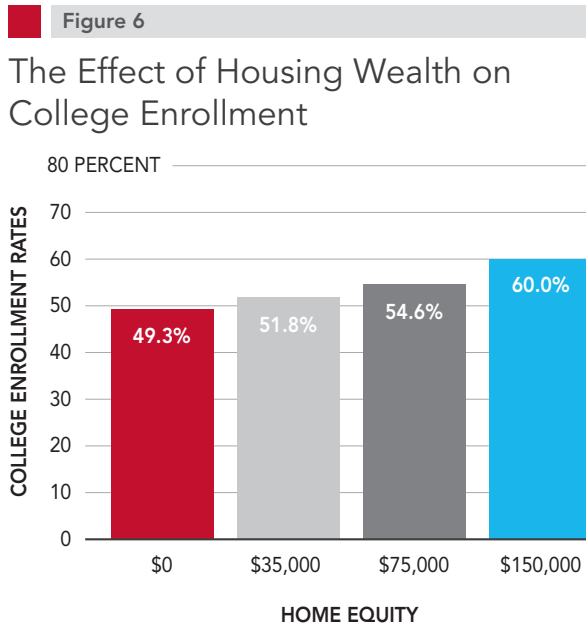
For more explanation of the research strategy, including potential challenges and how they were addressed, see the appendix.

## Results

**For every \$35,000 of home equity, the college enrollment rate increased by 5 percent.**

Figure 6 presents the results of simulating college enrollment rates for otherwise identical households with different levels of home equity. For students from homeowner families with no equity in 2005, the college attendance rate would have been 49.3 percent. The 25<sup>th</sup> percentile of the equity distribution among homeowners—that is, the equity of the family that had less equity than 75 percent of families—was \$35,000 in 2005.<sup>26</sup> Increasing home equity by \$35,000 increased the college enrollment rate to 51.8 percent. At the median home equity level of \$75,000, 54.6 percent of potential students attended college, and at the 75<sup>th</sup> percentile of home equity (\$150,000), the college enrollment rate was 60 percent.

Thus, for every \$35,000 of home equity, the college enrollment rate increased by 5 percent from the no-home-equity baseline. Increasing a family's equity from the 25<sup>th</sup> to the 75<sup>th</sup> percentile of the home equity distribution boosted college enrollment by more than 8 percentage points, or by 16 percent.



SOURCE: Regression coefficient estimates in Table 2 of Lovenheim (2011).

NOTE: Simulations of college enrollment rates of young adults who were 18 or 19 years old between 2001 and 2005. The home equity levels refer to the 25th, 50th and 75th percentiles of the home equity distribution in the PSID sample. Dollar amounts are in 2007 CPI-U-adjusted dollars.

These findings represent large changes in college enrollment due to family wealth, and they point to a significant effect of the housing boom on college enrollment. Between 2001 and 2005, average home equity increased by \$57,965, which implies that rising housing wealth increased college enrollment by 4.1 percentage points, or by 8 percent, compared with what it would have been without the housing boom.<sup>27</sup>

The effect of family wealth on college enrollment for the whole sample potentially masks large differences across the income distribution. If low- and middle-income households are more likely to be financially constrained in paying for

a postsecondary education, their decisions should be more sensitive to housing wealth fluctuations than those of upper-income households.

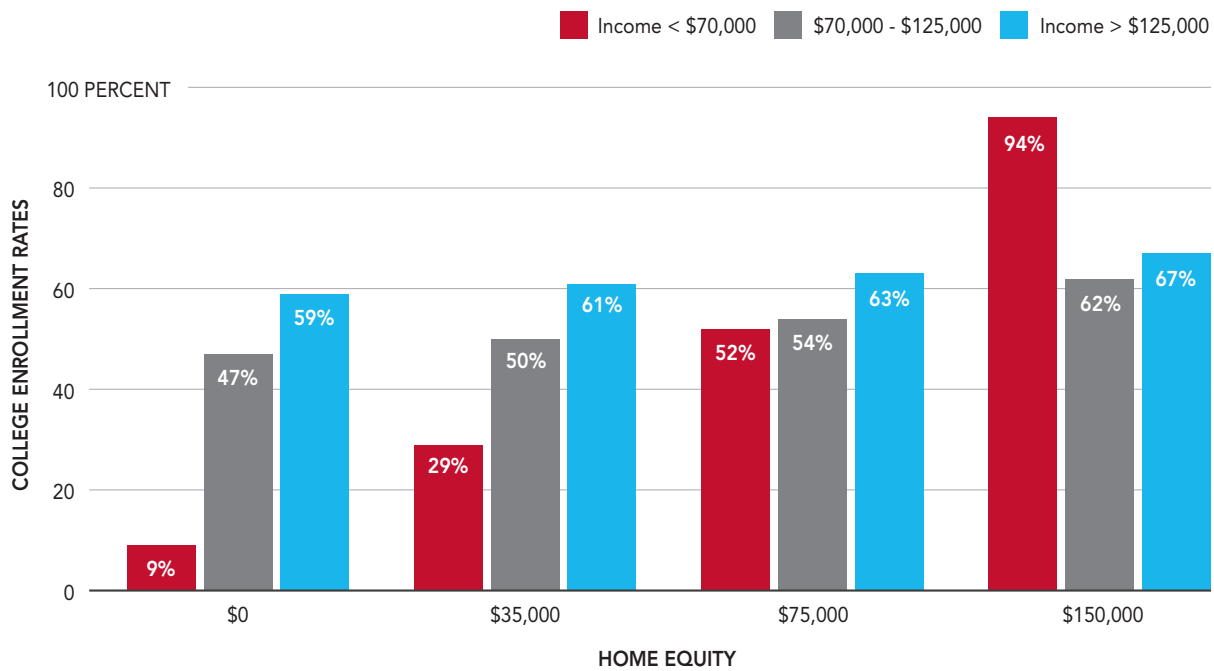
Figure 7 shows predicted college enrollment rates by home equity levels separately by family income group. The groups analyzed are families with less than \$70,000 in yearly income, those with \$70,000 to \$125,000 in yearly income and those earning more than \$125,000 per year. Although the lower-income group, which corresponds roughly with the bottom 60 percent of families, is not poor by traditional standards, it incorporates middle-income households who do not have many financial resources but who are nonetheless ineligible for federal and state financial aid. It is these middle-income households for whom the financial burden of college is likely to be the highest.

**Increasing home equity from zero to \$35,000 among low- and middle-income families increased their college attendance rate by more than 210 percent.**

Figure 7 demonstrates that low- and middle-income families are the most responsive to housing wealth changes. Having home equity at just the 25<sup>th</sup> percentile (\$35,000) increased the college attendance rate from 9 percent to 29 percent, an increase of more than 210 percent. Increasing equity to \$75,000 would increase college enrollment to 52 percent among this group, and the model

Figure 7

Effect of Housing Wealth on College Enrollment, by Family Income



SOURCE: Regression coefficient estimates in Tables 2 and 3 of Lovenheim (2011).

NOTE: Simulations of college enrollment rates of young adults who were 18 or 19 years old between 2001 and 2005. The home equity levels refer to the 25th, 50th and 75th percentiles of the home equity distribution in the PSID sample. These results are based on models estimated separately for each income group. Dollar amounts are in 2007 CPI-U-adjusted dollars.

predicts that increasing it to \$150,000 would increase enrollment to 94 percent. There are few families in this income group with such high home equity, but these results demonstrate that housing wealth particularly affects college decisions by lower-income families: Each additional \$10,000 in home equity raised college enrollment by 6 percentage points.

Among low- and middle-income families, average home equity actually increased by \$15,611 between 2001 and 2005, implying that rising housing wealth increased college enrollment by

9 percentage points, or by 24 percent compared with what it would have been without the housing boom. Just 37 percent would have enrolled, rather than the 46 percent who did. Figure 7 also shows that college-going responds much less to housing wealth for higher-income households, and one cannot statistically reject that housing wealth has *no* effect on college enrollment for these groups.

The fact that lower-income households are the most responsive to home equity is particularly important for economic mobility. When housing prices rise, as

happened in the first half of the past decade, economic mobility should increase as access to higher education grows among lower-income households relative to higher-income households. Conversely, when home prices decline, as they have since the second half of the decade, the results from Figure 7 suggest economic mobility could decrease as

children from lower-income households reduce their college-going relative to students from higher-income families. In general, this analysis strongly suggests that low- and middle-income families face financial difficulties paying for college, and demonstrates that these difficulties are highly sensitive to housing market fluctuations.

# How Important is Family Wealth for College Quality?

Beyond the decision of whether to enroll in college, financial constraints could affect the quality of schools chosen. There is growing evidence that students who attend a higher-quality university are more likely to graduate and to earn substantially more after graduation.<sup>28</sup> This section presents results using the college sector of attendance as an indicator of “quality,” but analyses using other measures of quality that are correlated with sector—such as students’ SAT scores, graduation rates and per-student expenditures—yield similar conclusions.<sup>29</sup>

In general, the various college sectors (two-year, non-flagship public four-year, flagship public and four-year private) differ dramatically in their level of resources and the academic preparation of the students they enroll. They also differ in the cost of attendance, with more elite institutions having much higher costs. Thus, it is important to understand whether these greater costs present a barrier for access to higher-quality schools among lower-income households. The analyses in this section assess the extent to which students’ choices about which type of school to

attend change when their families’ home prices increase.

## Data and Methods

The data for these analyses come from the 1997 National Longitudinal Survey of Youth (NLSY97). This is a nationally-representative survey of students who were ages 12 to 17 in 1997, and who have since been tracked annually. The restricted-use version of the data contains the metropolitan area in which each respondent lived in 1997 and detailed information about the colleges they attended. The sample in these analyses is confined to youth who lived in a metropolitan area in 1997, graduated from high school and went to college within two years.<sup>30</sup>

Similar to the strategy for the college enrollment analyses, the analyses in this section and the next compare college-sector choices of observably similar students who lived in the same metropolitan area but graduated from high school at different times. As a result, the changes in their home prices differed

because of variation in the timing and strength of the housing boom across cities.

This research strategy is subject to similar challenges as the research used in the college enrollment analyses, and the appendix details the ways in which these challenges were considered.<sup>31</sup> Of note, in addition to a rich set of state, student, and family background characteristics, the analyses also statistically account for the Armed Forces Qualification Test (AFQT) scores of young people, which provide a strong measure of each student's academic preparation for college.<sup>32</sup> Including this variable in the empirical model allows a comparison of college choices made by students with the same test scores.<sup>33</sup>

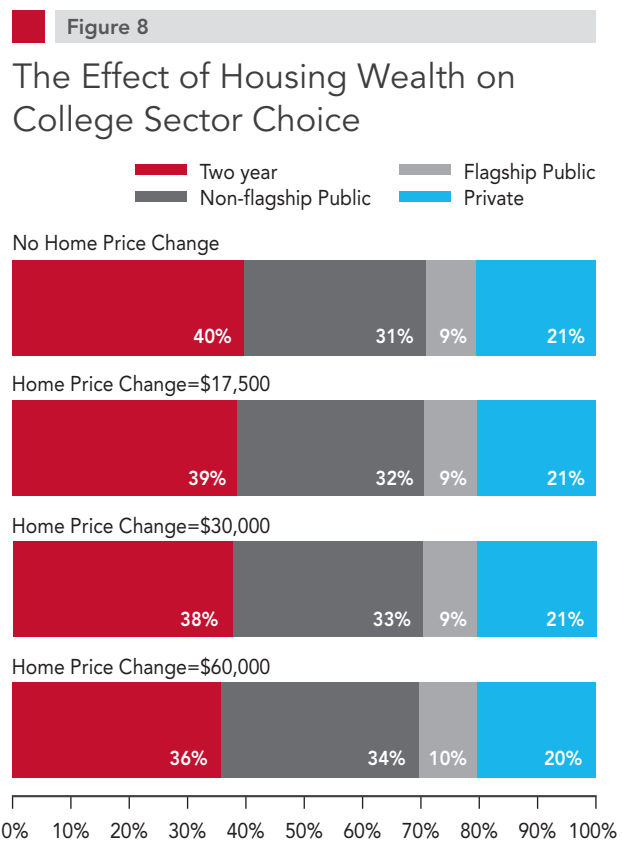
## Results

### Home price increases induced students to attend higher-quality schools.

Figure 8 shows the predicted school type distribution of students exposed to different magnitudes of recent home price changes. For the sample as a whole, home price increases resulted in students attending higher-quality schools, with the changes occurring entirely within public institutions.<sup>34</sup>

At the median home price change of \$30,000, students increased attendance in state flagships by half of a percentage point, or 6.2 percent relative to the baseline of no increase in home price.

The share attending two-year schools also decreased, from 39.6 percent to 37.7 percent, a decline of almost 5 percent. The sorting out of the two-year sector is likely to have important long-run consequences, as students who enroll in community college have lower wages and are less likely to obtain a four-year degree than those who enroll in a four-year school.<sup>35</sup>



SOURCE: Multinomial logit estimates in Table 3 of Lovenheim and Reynolds (2011).

NOTE: Simulations of college sector enrollments rates among college attendees based on multinomial logit estimates and representing the marginal effects setting all other variables at their means. The home price changes refer to the 25th, 50th and 75th percentile of the four-year home price change distribution in the NLSY97 sample. Dollar amounts are in 2007 CPI-U-adjusted dollars. Bars may not add to 100 percent due to rounding.



**The effect of increased wealth from rising home values on college quality was most pronounced for low- and middle-income families.**

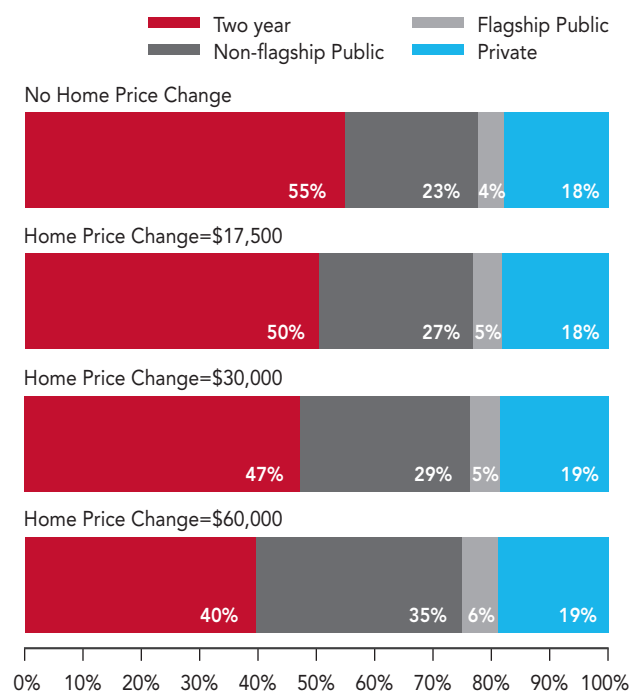
As shown in Figure 9, for low- and middle-income families, a \$30,000 increase in home prices led to 0.8 of a percentage point increase in the likelihood of enrolling in a state flagship, which translates into an 18 percent change. At the 75th percentile of home price changes, which is \$60,000, students from families earning less than \$70,000 per year were 35 percent more likely to enroll in a state flagship university than were peers from families experiencing no appreciation in home price. They also were 28 percent less likely to enroll in a community college. For the full sample, there was no effect of home price changes on private-sector enrollment. However, low- and middle-income youth whose families experienced \$60,000 in recent home price changes were 6 percent more likely to enroll in a private university (though this effect is not statistically different from zero).

These results present strong evidence that students select higher-quality schools when their home prices increase, and that this effect is largest among low- and middle-income families. Home prices rose by \$38,455 among the average low- to middle-income youth in the youngest cohort from 1998 to 2002, producing a 24 percent increase in flagship enrollment among those attending college and a 17

percent decline in community college enrollment. Although not shown, there is little evidence that college sector choices are influenced by home price changes for higher-income families.<sup>36</sup>

**Figure 9**

**The Effect of Housing Wealth on College Sector Choice for Families with Income Less than \$70,000**



SOURCE: Multinomial logit estimates in Table 4 of Lovenheim and Reynolds (2011).

NOTE: Simulations of college sector enrollment rates among college attendees with family income less than \$70,000 per year, based on multinomial logit estimates and representing the marginal effects setting all other variables at their means. The home price changes refer to the 25th, 50th and 75th percentile of the four-year home price change distribution in the NLSY97 sample. The three income groups are pooled in the model, and interactions with home price change and 1997 homeownership are included. Dollar amounts are in 2007 CPI-U-adjusted dollars.



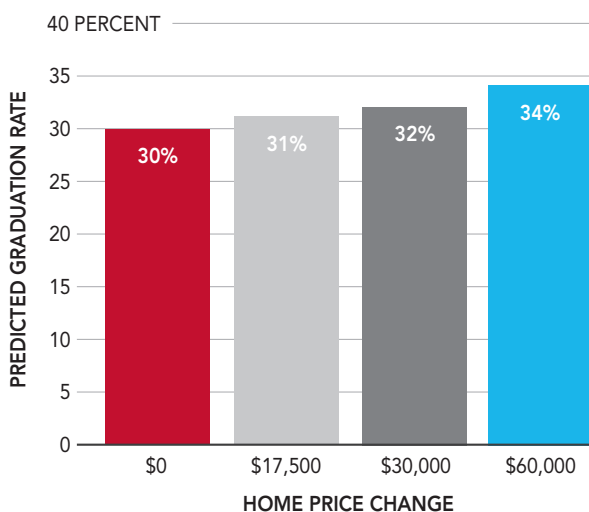
# How Important is Family Wealth for College Graduation?

A final, critical question is whether students who enroll in college and go to higher-quality schools due to the appreciation in their parents' home have better educational outcomes. Figure 10 shows the effect of different home-price changes on the likelihood of obtaining a college degree from a four-year institution for youth from families with incomes less than \$70,000 per year (based on the same data and methods as in the previous section). The graduation rate for this group is only 28 percent, which underscores the importance of understanding the forces that drive graduation outcomes.

The results in Figure 10 suggest that increasing families' financial resources when their children are of college-age could be a way to increase their children's likelihood of graduation. A \$30,000 increase in home prices led to a graduation rate of 32.1 percent, an increase of 2.1 percentage points (7 percent) over the baseline of no change. A \$60,000 increase in home prices while the student is in high school increased the probability of graduating by more than 4 percentage points (14 percent).

**Figure 10**

The Effect of Housing Wealth on Four-year College Degree Receipt for Families with Incomes Less than \$70,000



SOURCE: Regression estimates in Panel B of Table 9, column (iii) of Lovenheim and Reynolds (2011).

NOTE: Simulations of college completion rates among college attendees with family income less than \$70,000 per year, based on regression estimates and representing the marginal effects setting all other variables at their means. The home price changes refer to the 25th, 50th and 75th percentile of the four-year home price change distribution in the NLSY97 sample. The three income groups are pooled in the model, and interactions with home price change and 1997 homeownership are included. Dollar amounts are in 2007 CPI-U-adjusted dollars.

Although this increase in resources is substantial, these results demonstrate that financial constraints likely play a

## HOW IMPORTANT IS FAMILY WEALTH FOR COLLEGE GRADUATION?

role in reducing graduation outcomes for low- and middle-income families. Given the actual increase in housing wealth the families of the youngest youth in the sample experienced from 1998 to 2002, college graduation rates were 2.7 percentage points (9 percent) higher than

they would have been absent the housing boom. Put another way, the boom raised the likelihood of college graduation to 32 percent, rather than the 29 percent it would have been with no change in home prices.

# Effects of the Housing Market Decline

As shown in Figure 4, by 2010 home prices had declined 35 percent from their peak in 2006. The results from the empirical analyses above suggest that this decline is likely to significantly affect college-related decisions, particularly among low- and middle-income families. Because a 35 percent decline in home prices represents a large proportion of home equity, it is estimated to have declined by 54 percent between 2006 and 2010 for homeowners with income less than \$70,000 per year.<sup>37</sup>

**Among students from low- and middle-income families, the housing bust could ultimately reduce college enrollment, including in community colleges, by 30 percent.**

That projection would hold if nothing else affecting college-going had changed after 2006. Of course, much did change, including the near collapse of the financial system and the resulting downturn of the economy. A weak job market may have induced many youth to enroll in college when they had difficulty finding a job. In addition, the 2009 federal stimulus greatly increased federal financial aid.

Thus, college enrollment among low- and middle-income youth actually increased. Nevertheless, those induced to enroll by the recession or the stimulus package only partly overlap with those who would have enrolled if their family's housing wealth had not deteriorated. A sizable fraction of low- and middle-income youth was prevented from enrolling in college because their families no longer had the financial resources to afford it, a direct result of the housing bust.

**Decreased family wealth due to the housing bust also could have a large effect on the types of colleges students from low- and middle-income families attend.**

The empirical estimates predict that a 35 percent decline in home prices will cause a 1.4 percentage point decline in enrollment in flagship public schools among students from families earning less than \$70,000 per year who enroll in post-secondary schooling. That is a 26 percent decline from the enrollment levels of the low- and middle-income youth examined in this report. The estimates also predict a 29 percent increase in community

college attendance among college-going low- and middle-income youth due to home price reductions in the United States. Finally, the results reported above for college completion suggest recent declines in home prices will reduce college-completion rates by 12 percent for students from families earning less than \$70,000 per year.

As noted above, other changes in the economy during the housing bust mitigated some effects of declining home values on college going. Still, it is clear that increases in family wealth, including housing wealth, are an important factor in the decisions of many youth to enroll in and complete college.

# Policy Implications

The results from this report speak most clearly to the role of housing wealth in college enrollment and completion, and thus it is not clear whether households are similarly responsive to other forms of wealth or to reductions in the cost of college attendance. Still, the good news is that increasing housing wealth among low- and middle-income families can increase rates of college enrollment and graduation and can increase access to higher-quality schools. This in turn can promote upward economic mobility.

The report's findings do not shed light on *how* wealth functions to promote educational attainment. In the most straightforward sense, families may simply draw down their wealth to directly finance education. But the additional collateral provided by wealth could also allow families to borrow more than they otherwise would—or perhaps an increase in wealth makes families feel more economically secure, and thus more open to their children taking on student loans or other debt to pay for a college education. Alternatively, greater wealth may improve family life in ways that promote better educational outcomes.

Helping families increase their wealth not only benefits them financially but also promotes upward economic mobility for their children. Moreover, the results of this report may actually *understate* the impact of predictably high financial assets on college attainment and completion, because they are based on families receiving a sudden windfall of wealth after children have been through their primary schooling. If children from low- and middle-income families never expect to attend college, an influx of wealth during high school may not be enough to convince them that college is a viable option (and they may not be academically prepared at that point).

The bad news is twofold. Although it is positive for the economy and American families that we are unlikely to see another unsustainable housing boom and subsequent bust, the bursting of the housing bubble reversed the gains in educational outcomes yielded by the boom. The sheer magnitude of the wealth gains seen by low- and middle-income families during the boom are unlikely to be matched by other investments or wealth-building tools, and it is difficult

to envision public policies that could produce similar gains in the short term.

Nonetheless, the report's findings suggest three broad policy approaches that could significantly reduce the gap in college enrollment and graduation by income. All are taken from the policy road map authored by the Economic Mobility Project's Principals, an ideologically diverse group of experts from the American Enterprise Institute, the Brookings Institution, the Heritage Foundation, the New America Foundation and the Urban Institute.<sup>38</sup> These policy approaches include supporting family asset building and wealth creation among low- and middle-income families, providing those students with better access to financial supports to help pay for college and focusing on increasing college completion rates.

### **Promote Asset Building Among Low- and Middle-Income Families**

Current policies aimed at promoting saving and asset building are largely targeted at upper-income families—those who likely would be saving anyway. The Corporation for Enterprise Development (CFED) estimates that the federal government annually spends nearly \$400 billion to promote asset building, 90 percent of which is administered through the tax code.<sup>39</sup> As a result, CFED finds that more than half of these benefits accrued to the wealthiest 5 percent of taxpayers in 2009. Low-income families received

next to nothing, because they often do not make enough money to owe income tax or to itemize their deductions. The Project's Principals have called for modification of federal supports and tax provisions to better target lower-income groups, especially as a strategy for helping them pay for college.<sup>40</sup>

Creating incentives for opening child savings accounts—bank accounts set up in children's names when they are young—is another possible mechanism for low-income families to develop wealth through small deposits and compound interest. For example, families who open an account with a \$500 deposit (potentially seeded by the federal government) and invest \$20 a month with a one-to-one federal match would save more than \$10,000 by the time their child is 18. The estimates presented here suggest that this would increase the likelihood of children from a low- or middle-income family attending college by nearly 20 percent.

Despite the recent volatility of the housing market, homeownership has historically been a powerful tool for asset building for Americans across the income distribution. For low-income families, it is often the largest asset they have. There are several ways policy makers could increase access to homeownership as a safe and secure savings vehicle, such as expanding eligibility of financial education for homeownership; making available simple “default” mortgage products that protect

families from unfavorable terms and conditions; and increasing tax credits for a portion of down payments, dependent upon income.<sup>41</sup>

### **Help Students Better Access Financial Aid**

Financial constraints are not the only factor impeding lower-income students' enrollment in college; academic preparation also is critical. However, even among high-performing students, those who are lower-income are significantly less likely to enroll in and graduate from college than those who are high-income.<sup>42</sup> Helping these students connect to federal financial aid could go a long way to increasing their enrollment in, and graduation from, college.

One way to help connect students to financial aid is by simplifying the Free Application for Federal Student Aid (FAFSA), the form issued by the Department of Education for determining eligibility for financial aid. A recent study found that it takes up to 10 hours to complete the 127 questions on the application, making the FAFSA more complex than the IRS's form 1040 for completing a tax return.<sup>43</sup> Alerting families of their children's financial aid packages earlier than the spring of their senior year in high school could also help lower-income families without alternative sources of college financing.<sup>44</sup>

### **Increase College Completion Rates**

This study's results suggest that increased family wealth produces much greater effects on college attendance than on college quality and graduation. Many students who were able to attend college because of the housing boom could not attend higher-quality schools or, in many cases, finish their degree. EMP research confirms that low-income students drop out of two- and four-year colleges at alarming rates: a mere 32 percent of college students from families in the bottom fifth of the income ladder obtain a degree, compared with 67 percent of students from the top fifth.<sup>45</sup>

Funding and evaluating high school programs that improve educational and labor market outcomes is a good first step.<sup>46</sup> Students also need better support during their transition from high school to college and throughout their postsecondary education. Encouraging states to develop longitudinal measurement systems to track completion rates by race, income and other demographic indicators is a critical step to better assessing student performance over time.<sup>47</sup> More attention also must be devoted to developing and evaluating programs that promote college completion, for example, through federal incentive grants to states and colleges.<sup>48</sup>

# Conclusion

Education has been considered a primary route to the American Dream for the better part of a century, and yet large disparities in educational attainment across the income distribution reinforce intergenerational gaps in economic mobility. This report suggests that college enrollment decisions—whether and where to attend—and graduation rates are affected by variation in family resources (as shown through housing wealth), particularly for low- and middle-income

families. Given the recent severe declines in housing wealth in many areas of the United States, the resulting differences in postsecondary investment by family income will only increase without policies designed to specifically address the growing difficulty these families face in financing a college education. Absent policy intervention, the decrease in wealth resulting from the housing bust could lead to a decrease in economic mobility that will persist far into the future.



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# Appendix: Explaining the Research Strategy

As noted in the report, the research strategy used here relies on a number of assumptions. This appendix lists potential objections to the assumptions in the report and describes how these objections were addressed. For complete details, see Lovenheim (2011) and Lovenheim and Reynolds (2011).

*Objection: If higher-ability students are more likely to live in Metropolitan Statistical Areas (MSAs) or neighborhoods with large home price changes, then those who experience home price changes will be more likely to go to college because they are more academically capable (or for some other unobserved reason), not because of the added family wealth.<sup>49</sup>*

In the enrollment analyses, since fixed MSA-level characteristics are controlled for, the only concern is whether there is a correlation between home price change *within* MSAs and unobserved factors. The analysis also controls for a rich set of background characteristics that mitigate even the within-MSA problem, but do not necessarily solve it (see note 22). The possibility that a correlation remains

between home price change within MSAs and unobserved factors was examined by estimating the effect of housing wealth on college enrollment separately by decade. Because housing wealth was lower and less liquid in the 1980s and 1990s, correlations between changes in home prices and college enrollment in these periods that were of similar magnitude to the 2000s correlation would indicate that home price changes may be correlated with unobserved factors. However, housing wealth affects college enrollment only in the 2000s, when it was most liquid.

The analysis also used four-year changes in MSA-level home price indices to instrument for individual home equity at the time college decisions are made. That is, they were used to predict individual home equity at that time, with the predicted equity substituted for the reported level in the analyses. This was done under the assumptions that the change in MSA-level average price affects current home equity levels, and that the change in MSA-level average price only affects college enrollment due to its impact

on housing wealth of the household (after accounting for fixed MSA characteristics and other potentially confounding factors). The estimated effect of housing wealth on college enrollment in this model is based only on within-MSA variation over time in the strength of the housing boom, leveraging the fact that students came of college age in different times, with respect to the large home price changes driven by the boom. This model eliminates any within-MSA and year differences in home price growth. The effects are similar to those in the main analyses, and larger in the 2000s than in earlier decades, although the standard errors increased due to a loss of statistical power.

In the case of college sector choice and graduation, the set of control variables accounted for include students' AFQT scores, which are a measure of cognitive ability (See endnote 31). The analysis controls for fixed state-level characteristics, so correlation between home-price change and unobserved factors is a problem only if it occurs within states. Though the analysis could not control for fixed MSA-level characteristics, which would narrow the problem even further, in the sector choice and graduation analyses, they are controlled for when examining direct measures of college quality, and the estimated effects of housing wealth were *bigger* than when only state-level factors were controlled.

Furthermore, using MSA-level housing price indices forces all home values within an MSA to change at the same rate, meaning that all home-price-change variation across families within an MSA is driven solely by differences over time in the strength of the housing boom, leveraging the fact that students came of college age in different times.

Within-MSA housing price growth rates are used to predict changes in individual home prices because the individual data used includes home prices only in 1997. A central concern is that home price growth will be higher for those with higher home values in 1997. If home price values in 1997 are correlated with unobserved factors that affect college choice and graduation, then the estimated effect of individual home-price growth on college choice will be exaggerated. However, the analysis estimated models that also control for 1997 home price levels, and they show results similar to those reported above. Because such models are identified only off of differential growth rates within cities over time, these results present evidence that the baseline results are not driven by unobserved correlation between unobserved family or youth factors and home price growth.

Finally, in the college choice and graduation models, homeownership in 1997 might also be correlated with

unobserved factors, leading to similar problems. However, the analysis found no statistically significant effects of homeownership on college quality in the models, and homeownership rates are high enough in the sample that the issue is potentially a problem for only a small fraction of families. Ultimately, any problem relating to 1997 home prices or homeownership being correlated with unobserved factors must be confined to factors that influence both the 1997 situation and price changes that occur *within the high school years* (which range from 1993 to 1997 for the oldest youth in the sample and from 1998 to 2002 for the youngest).

It is also worth noting that variation in the strength and timing of the housing boom across cities may be strongly related to local housing supply constraints, such as zoning regulation.<sup>50</sup> That makes it less likely that home price changes prior to college decision-making primarily reflect the influence of some unobserved factor that is really driving college decisions.

*Objection: Families with higher-ability students may be moving into areas with higher home price growth.*

As noted in the methods section, for the enrollment analyses, the analysis ensures that there are no moves across MSAs during the four-year period over which housing wealth change is measured by dropping such cases from the sample.

However, strategic moves by families of high-ability students could occur prior to the four-year period.

If such sorting across MSAs occurred, it would produce a correlation between MSA home price change and student ability, and so the robustness checks above provide evidence that sorting is not biasing the results. In order to further examine whether sorting is a confounding factor, the analysis used the panel structure of the PSID. Each respondent can be traced back to an original household in which they lived at the start of the PSID in 1968. This original household's MSA was then assigned to each current survey participant, and the average home price at the time of college decision-making from the 1968 household's MSA was used as an instrument for home equity. In other words, the 1968 MSA's home-price index in, say, 2005 was used to predict home equity in 2005, and the analysis then examined the relationship between predicted home equity and college enrollment (under the assumptions that the 1968 MSA's average home values in 2005 are indeed related to 2005 housing wealth, and that the only way the 1968 MSA's average home values in 2005 can affect college enrollment is by increasing individual home equity in 2005, after accounting for fixed characteristics of the 2005 MSA and other potentially confounding factors). Any migration occurring across cities will not affect the

validity of the resulting estimates. The results from this analysis are very similar to those that use change in actual MSA-level prices as instruments—the effect of home equity on college decisions is much stronger in the 2000s than in the previous decades, though the estimates are very imprecise. Still, the analysis suggests that moving across MSAs is not biasing the results.

Sorting is less of an issue for the college choice/graduation analyses because all locations are fixed as of 1997, and home price changes used for identification occur over different years for the youngest and oldest youth in the sample. The only cross-MSA sorting that could be problematic is that involving sorting into MSAs before 1997 based on anticipated housing value changes when the youth is in high school. Furthermore, in the models examining direct measures of college quality, which include controls for fixed MSA characteristics, the sorting would have to differ according to the age of the youth relative to the timing of the largest home price increases within each MSA.

*Objection: Local labor demand shocks may have caused an increase in home prices as well as increased college-going.*

The author re-estimated the two enrollment models relying on MSA-level price changes for renters only. If local labor demand shocks are driving the estimates,

then renters and homeowners should be similarly affected. However, in neither case do renters respond to MSA-level home price changes, suggesting these types of contemporaneous and unobserved shocks are not biasing the estimates. Furthermore, local or state macroeconomic conditions, such as the unemployment rate and real per-capita income, are controlled for in all models, making it unlikely that labor demand shocks will be unobserved. In the choice/graduation models, state-level college/non-college wage ratios are also controlled for, and because high-skilled labor demand is not highly localized within states, this is likely to effectively account for MSA-level skill-biased demand as well. Finally, during the housing boom, mortgage credit growth was higher in areas with *lower* income growth.<sup>51</sup>

*Objection: Because most states finance their schools through property taxes, which are a function of property values, it could be that high home price growth areas have growing school quality, which induces more students to attend college and to attend higher-quality schools.*

There is much evidence in the economics of education literature that refutes the hypothesis that increased funding for schools leads to better educational outcomes.<sup>52</sup> Using the NLSY97 data, the author estimated models of high school graduation to examine whether students experiencing recent home price changes were more likely to graduate from high



school. No such relationship appears in the data, suggesting that the results and conclusions of these analyses are not due to increasing K-12 education quality.

*Objection: If strong macroeconomic growth raised state tax revenues, it may have improved students' college quality, rather than greater family wealth doing so.*

In addition to the lack of evidence noted above that macroeconomic shocks are important, the author also estimated the direct effect of state-level housing price change on state-level college resources. The evidence for effects is very weak, with no consistent effects across the three types of public colleges, and faculty-student ratios in four-year colleges *declining*

as housing prices increase (because enrollment in non-flagship schools increased).

*Objection: The assumptions in estimating counterfactual change in housing wealth barring equity extraction are unrealistic.*

The Survey of Income and Program Participation (SIPP) has more information on home loans than the PSID does—including the loan term and interest rate—requiring fewer assumptions to be made in estimating this counterfactual. However, it allows only for the observation of two years of housing price and equity changes. Nonetheless, the results using the SIPP were similar to those presented here.



# Endnotes

1 An estimate of the four-year change in home value when each respondent is in high school was used to measure the change in housing wealth experienced. Home equity was calculated from the self-reported home value and remaining principal balance in the Panel Study of Income Dynamics.

2 For full methodological details, please see the data and methods sections and the appendix explaining the research strategy.

3 Flagship public universities are each state's elite public institution. In the case of California, Texas and New York, there are multiple flagships.

4 Because of the overall deterioration of the economy in the same time period, particularly the combination of a faltering job market and more generous federal financial aid, these effects were countered substantially and limited the decline in college-going.

5 Isaacs, Sawhill and Haskins (2008).

6 See Autor, Levy and Murnane (2003) for a description of the skill upgrading of the United States economy.

7 Bound, Lovenheim and Turner (2010a) show that college resources have large effects on college completion rates, and Bound, Lovenheim and Turner (2010b) present evidence that collegiate resources reduce time to degree. Rouse (1995), Long and Kurlaender (2009) and Reynolds (2009) all show that two-year college attendance is associated with lower educational attainment.

8 College Board (2010).

9 2004 Survey of Consumer Finances (author's calculations).

10 Shiller (2010).

11 Current Population Survey (CPS) March Supplements.

12 Isaacs, Sawhill and Haskins (2008).

13 Ibid.

14 Author's calculations from the October Current Population Survey.

15 Lovenheim and Reynolds (2011).

16 Haskins, Holzer and Lerman (2009); Dynarski and Scott-Clayton (2006); Bettinger et al. (2009).

17 Some recent work in economics has suggested that most of the differences in college investment by family income is due to academic preparation and not family resources at the time of the attendance decision (e.g., Carneiro and Heckman, 2002; Cameron and Taber, 2004). These studies use data from cohorts graduating high school in the early 1980s, and as Figure 3 shows, college costs were much lower in that time period. In contrast, analyses using more recent data point to a larger role for financial constraints in driving differences in college enrollment by family income (Belley and Lochner, 2007).

18 While outside the scope of this particular paper, it is important to note that academic preparation reflects both underlying achievement gaps and high school preparation, including high school and peer group quality. See both Turner (2004) and Bettinger (2009) for more information about how college quality and costs could have important impacts during the college application stage, or Lareau (2007) for an examination of how behavioral differences between income groups affect achievement. Other research focuses on how the

magnitude of achievement gaps has changed over time (Reardon, 2011).

19 Analyses in Lovenheim (2011) show that about half the increase in home equity extraction was due to increasing home prices and half was due to extraction becoming easier.

20 This section presents a relatively non-technical overview of a research paper by the author (Lovenheim, 2011). Interested readers can consult the paper for technical details of the estimation strategy and for a detailed discussion of the data.

21 In 1997 the PSID switched from yearly sampling to a bi-yearly sampling. Thus, the analysis uses survey years 2001 (focusing on the change in housing wealth from 1997 to 2001), 2003 (focusing on the change from 1999 to 2003) and 2005 (focusing on the changes from 2001 to 2005).

22 The validity of the empirical model rests on two key assumptions. The first is that recent home price growth positively impacts current housing wealth levels, which the data show to be true. The second is that after accounting for the potentially confounding observable factors, earlier *changes* in housing wealth affect youth college decisions *only* by affecting their housing wealth at the time of decision-making. If these assumptions are correct, the problem of unrecognized confounding factors will disappear because housing wealth changes are related to current housing wealth but not these other unobserved factors. The relationship between predicted housing wealth and college-going will then indicate the causal importance of housing wealth on college enrollment.

23 These variables include whether or not the household owns its home in all four years; the educational attainment, age, marital status and sex of the household head; the number of dependents under age 18 living in the household; the youth's race and gender; total family income; per capita income in the MSA or state in which the household lives; the state unemployment rate; the size of the 18- to 22-year-old population in the state; the year in which a youth is observed; and the MSA or state in which the youth

is observed. MSAs may be identified in the PSID by applying for and accessing restricted-use data.

24 Home ownership in these analyses indicates the family owned their home over all four years.

25 Home equity in any year may be computed from self-reported home values and remaining mortgage principal, and so computing the actual change in housing wealth is straightforward. To estimate the *counterfactual* change in housing wealth, one must estimate what housing equity at the end of the four-years *would have been* barring any equity extraction. That requires estimating what the remaining principal would have been.

The author first estimates each household's mortgage interest rate and loan age at the beginning of the four-year period. This involves assigning an interest rate for typical mortgages originated 0 to 30 years ago for all years in the sample, under the *assumption* that all mortgages have a 30-year term and fixed interest rates equal to the national average in the originating year. With these assigned interest rates, the author computes the ratio of monthly mortgage payment to remaining principal for each loan age in each year. Each of these ratios corresponds to an interest rate/loan age pairing that might be assigned to a household's mortgage in a given year.

Next, the author computes the mortgage-payment-to-remaining-principal ratio for each household at the beginning of the four-year period (both the numerator and denominator are reported in the PSID). To assign each household's mortgage in that beginning year an interest rate and loan age combination, the author chooses from the combinations available in that year the one corresponding to the payment-to-principal ratio that is closest to the household's ratio (technically, the one that minimizes the squared difference between the household's payment-to-principal ratio and the corresponding candidate ratio).

Computing the counterfactual remaining principal (with no equity extracted) at the end of the four-year period is straightforward using the monthly mortgage payment reported by the household in that year, the assigned loan interest rate and the loan age (adding four to the assigned age at the beginning of the four-

year period). The counterfactual housing wealth is just reported home value minus the counterfactual remaining principal. Finally, the counterfactual change in housing wealth is this estimate minus the housing wealth computed four years earlier from reported home value and remaining principal. All families who do not own their home in all four years are assigned a counterfactual change of zero.

26 All dollar amounts are in 2007 dollars, adjusted for inflation using the CPI-U.

27 College enrollment in 2005 in the sample was 57.6 percent among homeowners, so it would have been 53.5 percent in the absence of the housing boom. The 4.1 percentage point increase is 8 percent of the 53.5 percent counterfactual.

28 Reynolds (2009); Bound, Lovenheim and Turner (2010a); Rouse (1995); Brewer, Eide and Ehrenberg (1999); Hoekstra (2009); Black and Smith (2004, 2006).

29 This section and the next present evidence from a second research paper (Lovenheim and Reynolds, 2010). Interested readers can consult that paper for technical details of the estimation strategy and for a detailed discussion of the data.

30 A limitation of these data, however, is that housing information only is available for 1997. Because home equity accumulation in the time period the student is making college decisions is unobserved, an estimate of the four-year change in home value when each respondent is in high school is used to measure the change in housing wealth experienced. This home price change is estimated in three steps. First, the family's home value when the youth was 17 is estimated by inflating the reported 1997 home value based on the increase in metropolitan-wide home prices from 1997 to the year the youth was seventeen. The family's home value when the youth was 13 years old is estimated in the same way. Finally, the change in home value experienced by the family is just the difference of these two estimates. To the extent that family home value changes are reflected in metropolitan-wide price changes, this measure is

similar to the change in home wealth experienced in the absence of equity extraction (see endnote 21).

31 The key assumptions are that after accounting for the rich set of potentially confounding factors, changes in metropolitan home prices in the four years prior to college decision-making, 1997 home values, and whether or not a family owns its home in 1997 are unrelated to anything else that affects college sector choice.

32 AFQT scores reflect family background and other influences to some extent, so it is not accurate to say that scores reflect only differences in cognitive ability.

33 The model also controls for family income, maternal and paternal education, sex, race/ethnicity, age in 1997 (birth cohort), whether the family owned or rented in 1997, the state of residence, state unemployment rates, state per capita income, the number of four-year and two-year institutions per 18- to 24-year-old in the state, the ratio of hourly wages of 25- to 55-year-olds with a bachelor's degree in the state to hourly wages for those with an associate's degree, the same ratio comparing college graduate's wages to those of high school graduates, the state's real need-based aid per student, and indicators for missing data for parental education and family income. All of the state-level variables are measured when the youth is eighteen years old. Renters in 1997 are included in the analyses and assigned home value changes of zero. Youth who did not take the AFQT are omitted (about 16 percent of college-going youth in the survey).

34 It is likely that the absence of an effect on attending private universities is partly due to those schools being more likely to take home equity into account in considering institutional aid to students.

35 Reynolds (2009); Rouse (1995); Bound, Lovenheim and Turner (2010a); Lovenheim and Reynolds (2011).

36 Housing price change induces families with incomes between \$70,000 and \$125,000 to switch from non-flagship to flagship public colleges, but no other effects are statistically significant at conventional levels. The author also finds that housing wealth

improves the quality of schools students attend in terms of math SAT scores, faculty-student ratios, expenditures per student, instructional expenditures per student and graduation rates. The effects are confined to four-year schools and primarily concentrated on low- and middle-income youth. Finally, housing wealth increases the likelihood of attending college out of state. See Lovenheim and Reynolds (2011).

37 This calculation assumes that homeowners with income under \$70,000 experienced the same average price decline as homeowners in general.

38 Economic Mobility Project Principals (2009).

39 CFED (2008). See also Cramer et al. (2009); and Carasso, Reynolds and Steuerle (2008).

40 Economic Mobility Project Principals (2009).

41 Ibid. The Dodd–Frank Wall Street Reform and Consumer Protection Act, signed into law on July 21, 2010, included a variety of housing reforms. For instance, the Consumer Financial Protection Bureau was required to propose model disclosure for mortgage loan transactions, and the Department of Housing and Urban Development was charged with creating an Office of Housing Counseling. Debates about

regulations related to minimum mortgage standards and credit retention requirement are ongoing as policy makers grapple with the challenge of making homeownership an accessible, safe and secure investment.

42 College Board (2008).

43 Haskins, Holzer and Lerman (2009).

44 Ibid.

45 Ibid.

46 Economic Mobility Project Principals (2009).

47 Ibid.

48 Haskins, Holzer and Lerman (2009).

49 A Metropolitan Statistical Area is a geographic entity defined by the U.S. Office of Management and Budget (OMB) for use by Federal statistical agencies.

50 Gyourko, Mayer and Sinai (2006) and Glaeser, Gyourko and Saks (2005).

51 Mian and Sufi (2009).

52 Hanushek, Eric A. (2003).





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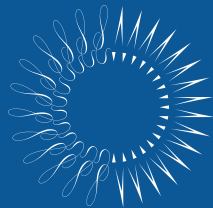
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