

Housing Bust and Long-Term Human Capital Scarring in the U.S.

NBER Summer Institute 2026

Household Finance

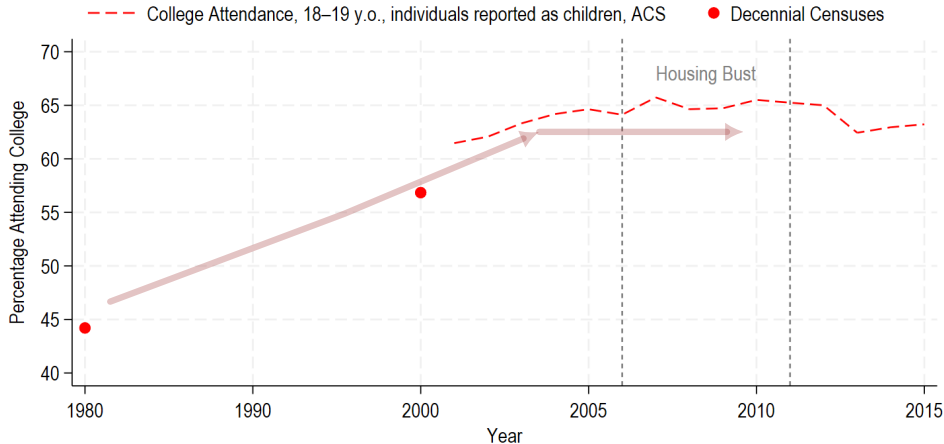
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July 24, 2026

U.S. College Attendance Rate: Rise, Stagnation, and Decline

College Attendance in the US, 18–19 year olds reported as children

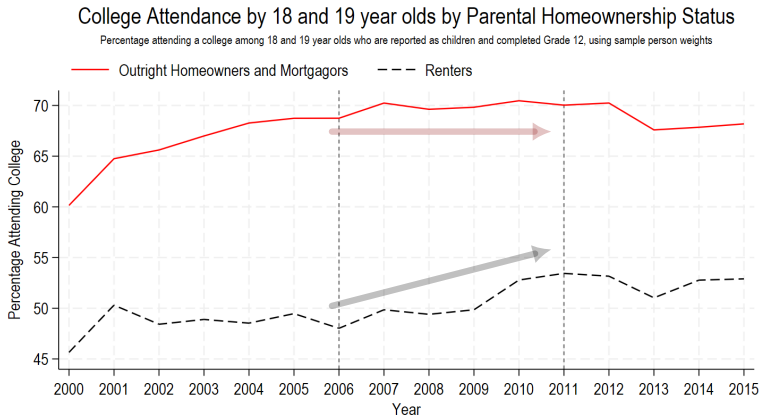
Percentage attending college among 18–19 year olds who are reported as children and completed Grade 12, using sample person weights



Source: 1980, 2000 Census; 2001–2015 American Community Survey.

Muted Countercyclical College Response of Homeowners' Children

Homeowners' children do not show the same post-2008 countercyclical increase in college attendance as children of renters.



Source: 2000 Census, 2001-2015 American Community Survey.

Housing Wealth: Credit Constraints or Wealth Effect?

Question

- Are homeowners' children scarred after the housing bust?
- Does housing bust affect education through collateral constraints or a broader wealth channel?

Previous work

- Exogenous increases in parental home equity raise college enrollment.
- The mechanism remains indirect and appears collateral/credit based.

Literature

What this paper does

- We reconstruct HH balance sheet characteristics (debt, LTV, etc.) in a public household survey data (ACS)
- We link parental housing wealth shocks to child college enrollment

Findings

- Unlike consumption, education effects do not concentrate among tightly constrained homeowners.
- Homeowner–renter comparisons suggest persistent human-capital scarring.

Baseline Strategy Uses Local Housing Bust Intensity

$$College_{i,p,t,b} = \alpha_b + \alpha_{p,t} + \beta (\Delta_{2006,t-1} \ln HPI_p \times Owner_i) + X_i' \Gamma + \varepsilon_{i,p,t,b}.$$

Data

- ACS 2008–2011; children aged 18–19 with grade 12 completed.
- Zillow HPI mapped from ZIPs to 2000 PUMAs.
- Child demographics, income, siblings, parental education and age.

Identification

- $\alpha_{p,t}$ absorbs local opportunity costs, local GE feedback, and local credit supply, [Aruoba et al. \(2026\)](#).
- Formal assumption: conditional on $\alpha_{p,t}$, α_b , and controls,

$$Cov(\Delta \ln HPI_p \times Owner_i, \varepsilon_i) = 0.$$

Baseline Result: Homeowners' Children Respond Less

$$College_{i,p,t,b} = \alpha_b + \alpha_{p,t} + \beta (\Delta_{2006,t-1} \ln HPI_p \times Owner_i) + X_i' \Gamma + \varepsilon_{i,p,t,b}.$$

- In the same PUMA-year, homeowners' children have a muted countercyclical college response to housing bust relative to renters' children.
- Preferred estimate: $\Delta_{2006,t-1} \ln HPI \times Owner = 0.086$, with PUMA $\times$ year FEs, birth-year FEs, and demographic controls.

$$\hat{\beta} = 0.086^{***}$$

Full table

Student loans

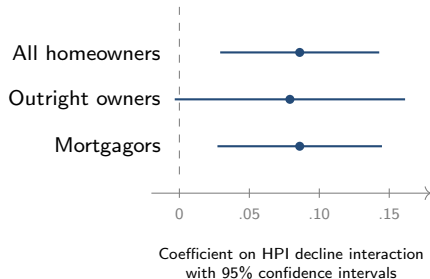
Robust to: homeowner-renter composition, matching on observable differences, alternative housing-shock measures, excluding large states.

Countercyclical response: employment probability responds similarly.

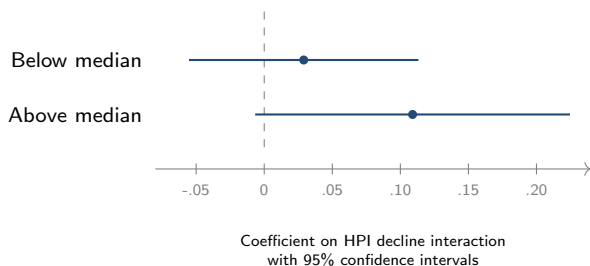
Student loans: no homeowner-renter difference in utilization.

Mechanism Test: No Evidence that More Constrained Owners Respond More

Owner type



Income heterogeneity



Owner-type coefficients difference out renters' countercyclical response. All specifications include PUMA $\times$ year FEs, birth-year FEs, and demographic controls.

Testing Credit Conditions Mechanism

Prediction: If credit conditions mechanism matters, restricted mortgagors should react more than unrestricted

- High leverage
- Recent homeowners
- High DSR

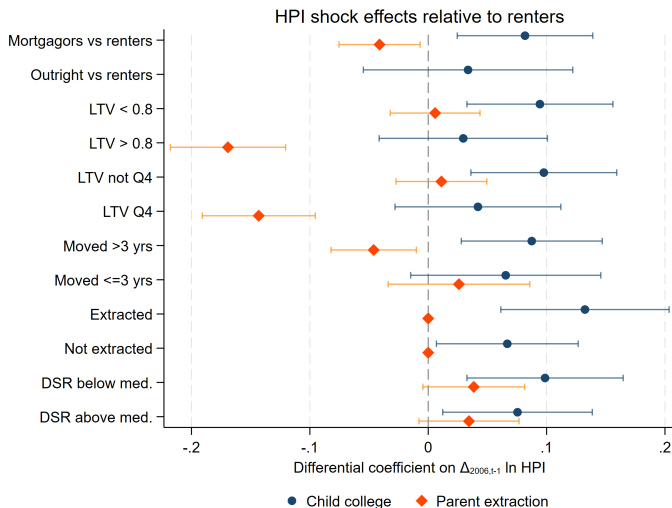
Sample and data

Data details

- Parent household heads with a mortgage and an 18–19 year-old child.
- ACS house value, mortgage payment, tenure, extraction (HELOC, second mortgage).
- Assumptions: first mortgage only, no refi, 30Y FRM, Zillow HPI house value growth

$$HomeEquity_{i,t-1} = HouseValue_{i,t-1} - MtgDebt_{it}$$

Mechanism Test: No Evidence that Constrained Mortgages Respond More



Collateral channel prediction: stronger response for

- High-LTV HHs;
- High-DSR HHs;
- Recent movers.

We do not see this pattern.

Table

Pre-trends

IV evidence

HPI shock coefficients are relative to renters. All specifications include PUMA $\times$ year FEs, birth-year FEs, and demographic controls.

Mechanism Test: Available Equity and HPI Shocks

Within mortgagors test: whether the college response to local HPI shocks is stronger for tighter balance sheets.

$$College_{ipt} = \beta_1(\Delta_{2006,t-1} \ln HPI_p \times LTV_i) + X'_{it}\Gamma + \alpha_{p,t} + \alpha_b + \alpha_T + \varepsilon_{ipt}.$$

Dependent variable	(1) College	(2) College	(3) College
$\Delta_{2006,t-1} \ln HPI \times LTV_{2006}$	-0.102 (0.068)		
$\Delta_{2006,t-1} \ln HPI \times LTV_{t-1}$		-0.107*** (0.035)	
$\Delta_{2006,t-1} \ln HomeEquity$			0.010 (0.012)
Controls	Yes	Yes	Yes
PUMA $\times$ year FEs	Yes	Yes	Yes
Birth-year FEs	Yes	Yes	Yes
Moved-in FEs	Yes	Yes	Yes
Observations	61780	67915	61721

The $HPI \times LTV_{t-1}$ coefficient is negative and significant: high-LTV mortgagors respond more counter-cyclically, not less, which cuts against a collateral-constraint explanation for college.

Human-Capital Scarring: Specification

$$Y_{ipbt} = \sum_{\tau \neq 2011} \beta_{\tau} (Owner_i \times \Delta_{2006,2011} \ln HPI_p \times \mathbf{1}\{t = \tau\}) + X_i' \Gamma + \alpha_{p,t} + \alpha_b + \varepsilon_{ipbt}.$$

Data

- ACS 2005–2020, birth cohorts 1991–1993.
- Outcomes: some college or more; log real total personal income among full-time workers.
- Event coefficients normalize 2011 to zero.

Assumptions

- Children live in their state of birth.
- $\alpha_{p,t}$ absorbs local shocks common to homeowners and renters.

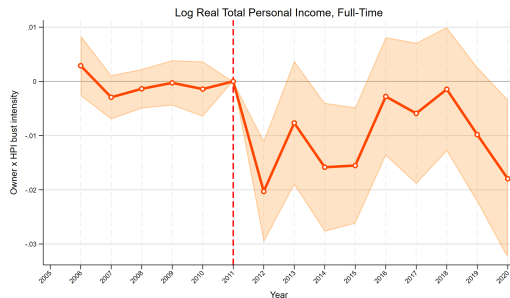
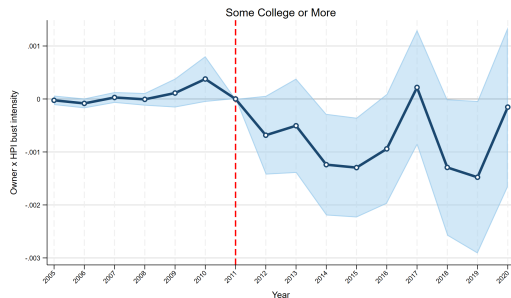
Caveats

- Children are observed while co-residing with parents.

Human Capital Scarring After the Housing Bust

Homeowner–renter differences persist beyond the college-age window.

Employment



Top-vs-bottom HPI quintile shock: 2.25 p.p. lower college attendance. Long-run effects: 0.13–0.15 p.p. lower some-college rate per 1 p.p. deeper HPI decline; peak income losses around 1.5–2 p.p.

Conclusion

- Housing busts mute college attendance among homeowners' children.
- The evidence is not consistent with a collateral-constraint mechanism.
 - Possible explanation: Education is not standard consumption but an intergenerational investment and a commitment good.
- Temporary negative housing-wealth shocks lead to permanent human-capital loss.

Appendix: Baseline Homeowner-Renter Housing Bust Sensitivity

	Dependent variable: College attendance					
	(1)	(2)	(3)	(4)	(5)	(6)
Owner	0.188*** (0.007)	0.110*** (0.007)	0.110*** (0.007)	0.140*** (0.007)	0.140*** (0.007)	0.140*** (0.007)
$\Delta_{2006,t-1} \ln HPI$	-0.132*** (0.027)	-0.168*** (0.027)	-0.162*** (0.028)	-0.122*** (0.034)	-0.134*** (0.036)	
$\Delta_{2006,t-1} \ln HPI \times Owner$	0.038 (0.030)	0.053* (0.029)	0.052* (0.029)	0.083*** (0.028)	0.083*** (0.028)	0.086*** (0.029)
Demographic controls		✓	✓	✓	✓	✓
Birth-year FEs			✓	✓	✓	✓
PUMA FEs				✓	✓	
Year FEs					✓	
PUMA $\times$ Year FEs						✓
Observations	104,294	103,954	103,954	103,902	103,902	103,837

[Back](#)

Appendix: Student Loan Uptake

PSID Transition to Adulthood Supplement (TAS). Among children who ever attended college, student-loan utilization is similar for children of homeowners and renters.

	Homeowners	Renters	Difference	
2009	45.9%	43.1%	2.8 p.p.	$p = 0.719$
2013	43.0%	44.1%	-1.1 p.p.	$p = 0.886$

TAS weights applied. The evidence does not support a disproportionate increase in federal student-loan borrowing by renters' children.

[Back](#)

Appendix: Relation to the Literature

- 1. Financial resources, credit constraints, and education.** Student loans, household resources, housing wealth, and human capital [Lochner and Monge-Naranjo \(2011, 2012\)](#); [Lovenheim \(2011\)](#); [Denning and Jones \(2021\)](#); [Black et al. \(2023\)](#).
This paper: temporary negative housing-wealth shocks lead to permanent human-capital loss.
- 2. Housing wealth shocks and consumption.** Housing wealth affects household spending, with leverage and credit constraints central in many settings [Mian et al. \(2013\)](#); [Aladangady \(2017\)](#); [Kaplan et al. \(2020\)](#); [Guren et al. \(2021\)](#); [Aruoba et al. \(2026\)](#).
This paper: education rather than consumption, non-collateral housing-wealth effect in education vs credit-constraint channel in consumption.
- 3. Home equity extraction, default, and intergenerational housing wealth transmission.** Equity extraction responds to rates, collateral, and institutional constraints [Bhutta and Keys \(2016\)](#); [Kumar \(2018\)](#); [Benetton et al. \(2024\)](#).
This paper: links child education to parental home equity using public household survey data with detailed mortgage information.

Appendix: Mortgagor Data Details

Balance-sheet construction

$$MtgDebt_{it} = \frac{MtgPay_{it}}{r_T/12} \left[1 - \left(1 + \frac{r_T}{12} \right)^{-12(30 - Tenure_{it})} \right]$$

$$HEquity_{i,t-1} = HValue_{i,t-1} - MtgDebt_{it}, \quad LTV_{i,t-1} = MtgDebt_{it} / HValue_{i,t-1}.$$

Assumptions

- Only first mortgage (no second liens, no HELOC, etc.)
- Assume 30-year fixed-rate mortgage.
- No refinancing in the imputed balance.

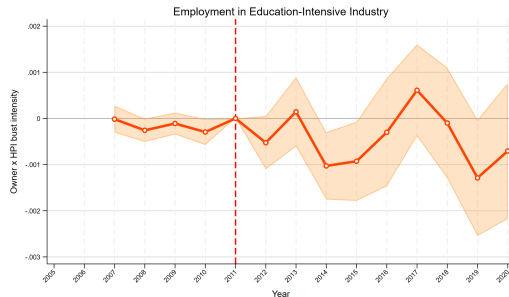
Validation. ACS-imputed home equity tracks SCF among mortgagors in 2007.

Appendix: Employment Scarring

Full-Time Employment



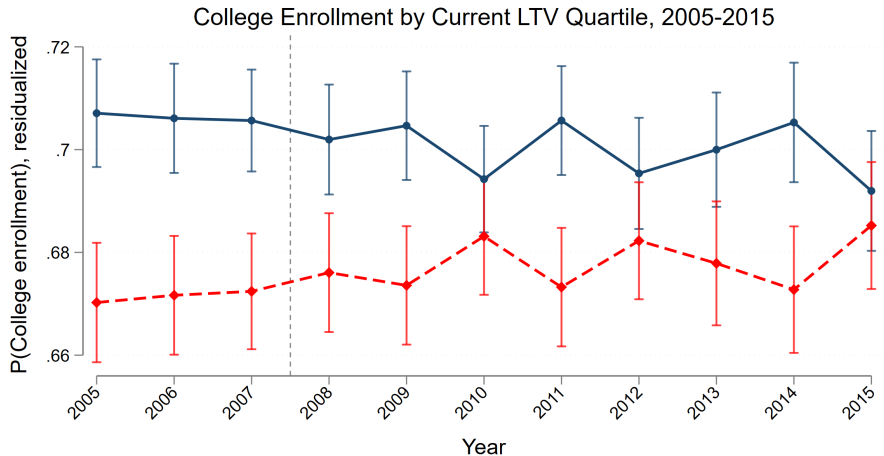
Education-Intensive Industry



[Back](#)

Appendix: Suggestive Graphical Evidence

LTV college gap does not widen. Residualized college enrollment by current LTV quartile. The high-vs-low LTV college gap narrows after 2008 rather than widening, weakening a collateral-constraint interpretation.



Appendix: IV Evidence – Specification

Benetton–Kudlyak–Mondragon-style test. Use the post-2008 shift in credit supply and extraction conditions interacted with pre-existing balance-sheet exposure to test whether extraction transmits home-equity shocks to college.

$$College_{ipt} = \beta \widehat{Extract}_{ipt} + \theta Equity_{i,t-1} + X'_{it} \Gamma + \alpha_p + \alpha_t + \alpha_T + \varepsilon_{ipt},$$

$$Extract_{ipt} = \pi (Post_{2008,t} \times Equity_{i,t-1}) + \theta Equity_{i,t-1} + X'_{it} \Gamma + \alpha_p + \alpha_t + \alpha_T + \nu_{ipt}.$$

IV evidence. If credit conditions bind, the first stage should translate into college through parental extraction.

[Table](#)[Back](#)

Appendix: IV Evidence – Table

	LTV t-1			LTV t-1 in Q4		
	OLS College	First stage	IV College	OLS College	First stage	IV College
Parent Extracted	0.028*** (0.003)		6.645 (8.417)	0.027*** (0.003)		-1.130 (0.709)
Post 2008 × LTV t-1		0.004 (0.006)				
Post 2008 × LTV t-1 in Q4					-0.016** (0.007)	
Controls	✓	✓	✓	✓	✓	✓
PUMA FEs	✓	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓	✓
Post FEs	✓	✓	✓	✓	✓	✓
Lagged LTV control	✓	✓	✓			
Q4 LTV control				✓	✓	✓
First-stage F		0.56	0.56		5.16	5.16
Observations	114,576	114,576	114,576	114,576	114,576	114,576

Equity is measured alternatively by lagged LTV and by within-year high-LTV status.

[Back](#)
[Back to mechanism](#)

Appendix: HPI Effects Relative to Renters

	Child college	N	Parent extraction	N
$\Delta_{2006,t-1} \ln HPI \times 1[\text{Mortgagor}]$	0.082*** (0.029)	90856	-0.041** (0.017)	90901
$\Delta_{2006,t-1} \ln HPI \times 1[\text{Outright homeowner}]$	0.034 (0.045)	33572		
$\Delta_{2006,t-1} \ln HPI \times 1[LTV_{t-1} < 0.8]$	0.094*** (0.031)	89259	0.006 (0.019)	89302
$\Delta_{2006,t-1} \ln HPI \times 1[LTV_{t-1} > 0.8]$	0.030 (0.036)	89259	-0.169*** (0.025)	89302
$\Delta_{2006,t-1} \ln HPI \times 1[LTV_{t-1} \notin Q4]$	0.098*** (0.031)	89259	0.011 (0.020)	89302
$\Delta_{2006,t-1} \ln HPI \times 1[LTV_{t-1} \in Q4]$	0.042 (0.036)	89259	-0.143*** (0.024)	89302
$\Delta_{2006,t-1} \ln HPI \times 1[\text{moved} > 3\text{yrs}]$	0.087*** (0.030)	90856	-0.046** (0.018)	90901
$\Delta_{2006,t-1} \ln HPI \times 1[\text{moved} \leq 3\text{yrs}]$	0.065 (0.041)	90856	0.026 (0.031)	90901
$\Delta_{2006,t-1} \ln HPI \times 1[\text{Extracted}]$	0.132*** (0.036)	90856	0.000*** (0.000)	90901
$\Delta_{2006,t-1} \ln HPI \times 1[\text{Not extracted}]$	0.067** (0.031)	90856	0.000*** (0.000)	90901
$\Delta_{2006,t-1} \ln HPI \times 1[DSR \leq p50_t]$	0.099*** (0.034)	90856	0.038* (0.022)	90901
$\Delta_{2006,t-1} \ln HPI \times 1[DSR > p50_t]$	0.075** (0.032)	90856	0.034 (0.022)	90901
Demographic controls	Yes		Yes	
PUMA $\times$ year FEs	Yes		Yes	
Child birth-year FEs	Yes		Yes	

Notes: Coefficients are homeowner or mortgagor-subgroup effects of $\Delta_{2006,t-1} \ln HPI$ relative to renters. Sample is 2008–2011 children. Row 2 uses outright homeowners and renters; other subgroup rows use the mortgagor subgroup and renters. Extraction is set to zero for renters only to keep the renter comparison; row 2 extraction is omitted. Extracted/not-extracted rows in the extraction column are mechanical and shown only for completeness. Controls are gender, race/ethnicity, log household income per person, siblings, parent education, parent age, and parent age squared. SEs clustered by PUMA-year. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

References I

- Lochner, L. J., and Monge-Naranjo, A. (2011). “The Nature of Credit Constraints and Human Capital.” *American Economic Review*, 101(6), 2487–2529.
- Lochner, L. J., and Monge-Naranjo, A. (2012). “Credit Constraints in Education.” *Annual Review of Economics*, 4, 225–256.
- Denning, J. T., and Jones, T. R. (2021). “Maxed Out? The Effect of Larger Student Loan Limits on Borrowing and Education Outcomes.” *Journal of Human Resources*, 56(4), 1113–1140.
- Black, S. E., Denning, J. T., and Rothstein, J. (2023). “Winners and Losers? The Effect of Gaining and Losing Access to Selective Colleges on Education and Labor Market Outcomes.” *American Economic Journal: Applied Economics*, 15(1), 26–67.
- Lovenheim, M. F. (2011). “The Effect of Liquid Housing Wealth on College Enrollment.” *Journal of Labor Economics*, 29(4), 741–771.
- Mian, A., Rao, K., and Sufi, A. (2013). “Household Balance Sheets, Consumption, and the Economic Slump.” *Quarterly Journal of Economics*, 128(4), 1687–1726.

References II

- Aladangady, A. (2017). “Housing Wealth and Consumption: Evidence from Geographically-Linked Microdata.” *American Economic Review*, 107(11), 3415–3446.
- Kaplan, G., Mitman, K., and Violante, G. L. (2020). “The Housing Boom and Bust: Model Meets Evidence.” *Journal of Political Economy*, 128(9), 3285–3345.
- Guren, A. M., McKay, A., Nakamura, E., and Steinsson, J. (2021). “Housing Wealth Effects: The Long View.” *Review of Economic Studies*, 88(2), 669–707.
- Aruoba, S. B., Elul, R., and Kalemli-Ozcan, S. (2026). “Housing Wealth and Consumption: The Role of Heterogeneous Credit Constraints.” *International Economic Review*. doi: 10.1111/iere.70086.
- Bhutta, N., and Keys, B. J. (2016). “Interest Rates and Equity Extraction during the Housing Boom.” *American Economic Review*, 106(7), 1742–1774.
- Kumar, A. (2018). “Do Restrictions on Home Equity Extraction Contribute to Lower Mortgage Defaults? Evidence from a Policy Discontinuity at the Texas Border.” *American Economic Journal: Economic Policy*, 10(1), 268–297.
- Benetton, M., Kudlyak, M., and Mondragon, J. (2024). “Dynastic Home Equity.” Federal Reserve Bank of San Francisco Working Paper 2022-13.