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

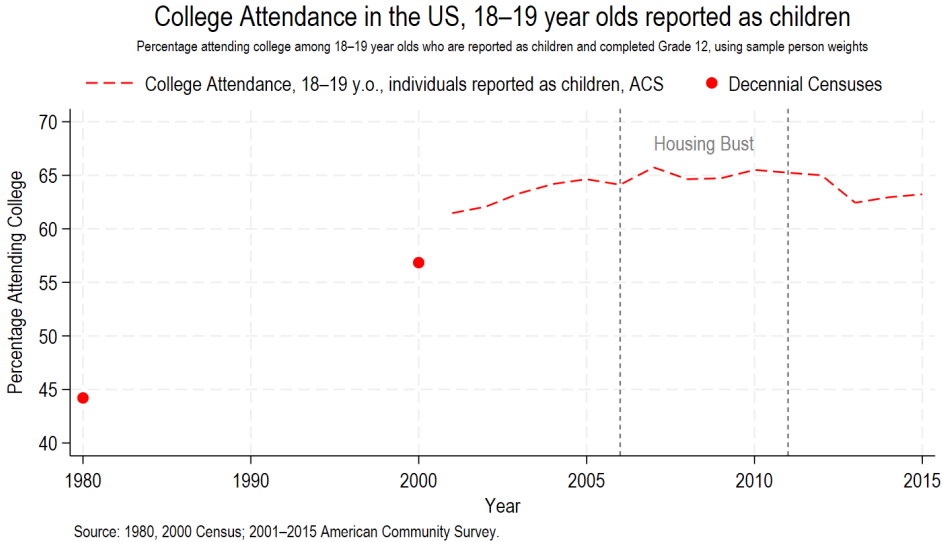
NBER Summer Institute 2026

Household Finance

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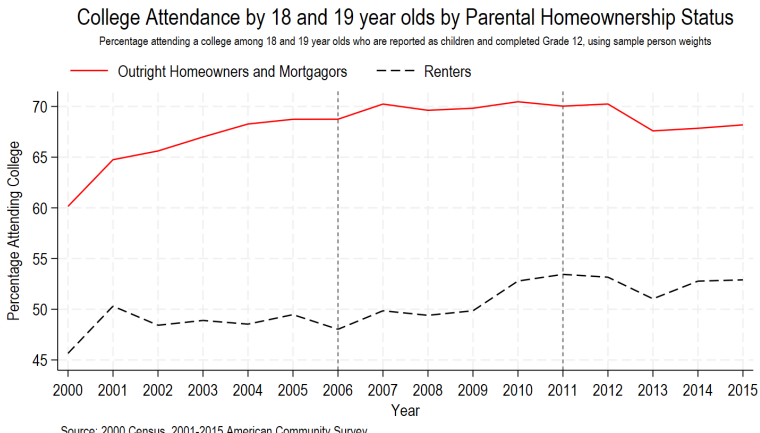
July 24, 2026

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



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.



Housing Wealth: Credit Constraints or Wealth Effect?

Question

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

Previous work Literature

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

What this paper does

- We link parents' mortgage balance sheets to child college enrollment in public household survey data.
- Unlike consumption, education effects do not concentrate among tightly constrained owners.
- Homeowner–renter comparisons suggest persistent human-capital scarring.

Baseline Strategy Uses Local Housing Bust Intensity

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

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: after $\alpha_{p,t}$, α_b, and controls,

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

Baseline Result: Homeowners' Children Respond Less

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

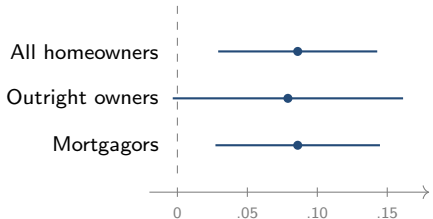
- In the same PUMA-year, homeowners' children have a muted countercyclical college response to housing bust relative to renters' children.
- Preferred estimate: $\Delta_{2006,t-1} \ln HPI \times Owner = 0.086$, with PUMA $\times$ year FEs, birth-year FEs, and demographic controls.

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

Full table

Mechanism Test: No Evidence that More Constrained Owners Respond More

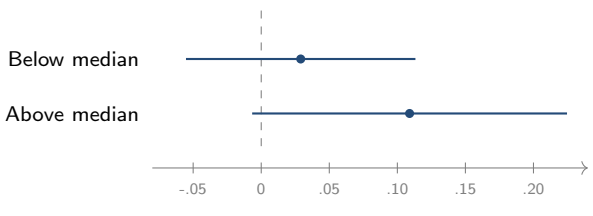
Owner type



Coefficient on HPI decline interaction with 95% confidence intervals

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

Income heterogeneity



Coefficient on HPI decline interaction with 95% confidence intervals

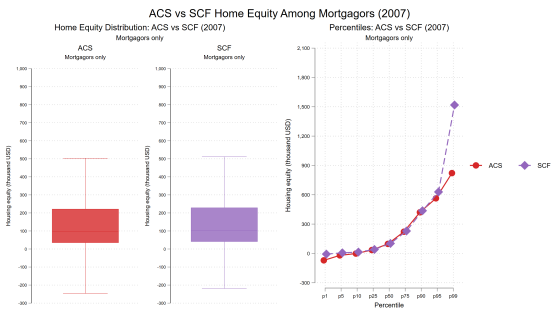
Testing Credit Conditions Mechanism

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

- High leverage
- Recent homeowners
- High DSR

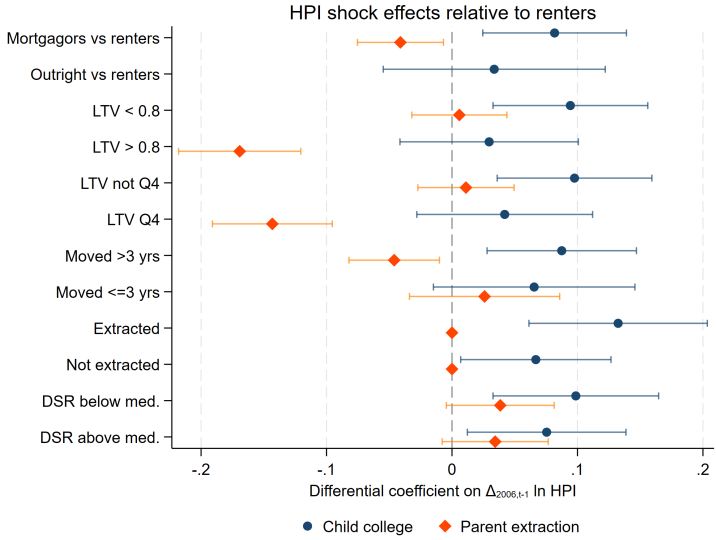
Sample and data Data details

- Parent household heads with a mortgage and an 18–19 year-old child.
- ACS house value, mortgage payment, tenure, 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 Mortgagors 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

Note: All specifications include PUMA × year FEs, birth-year FEs, and demographic controls.

Human-Capital Scarring Specification

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

Data

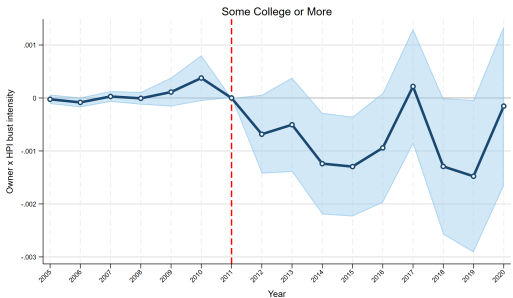
- ACS 2005–2020, birth cohorts 1991–1993.
- Outcomes: some college or more; log real total personal income among full-time workers.
- Event coefficients normalize 2011 to zero.

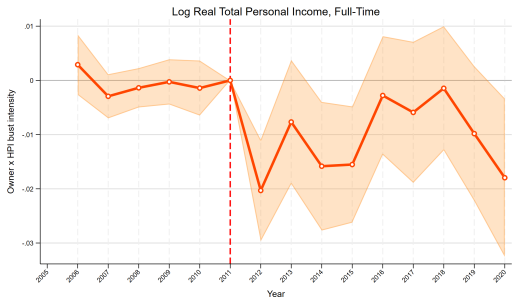
Assumptions

- Children live in their state of birth.
- Children are observed while co-residing with parents.
- $\alpha_{p,t}$ absorbs local shocks common to homeowners and renters.

Human Capital Scarring After the Housing Bust

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





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.
- Long-run outcomes suggest human-capital scarring.

Appendix: Baseline Homeowner-Renter Housing Bust Sensitivity

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

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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: Housing wealth shocks and human capital scarring
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.

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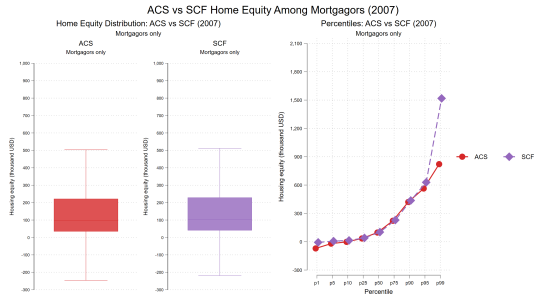
Appendix: Mortgagor Data Details

Balance-sheet construction

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

$$HEquity_{i,t-1} = HValue_{i,t-1} - MtgDebt_{it},$$

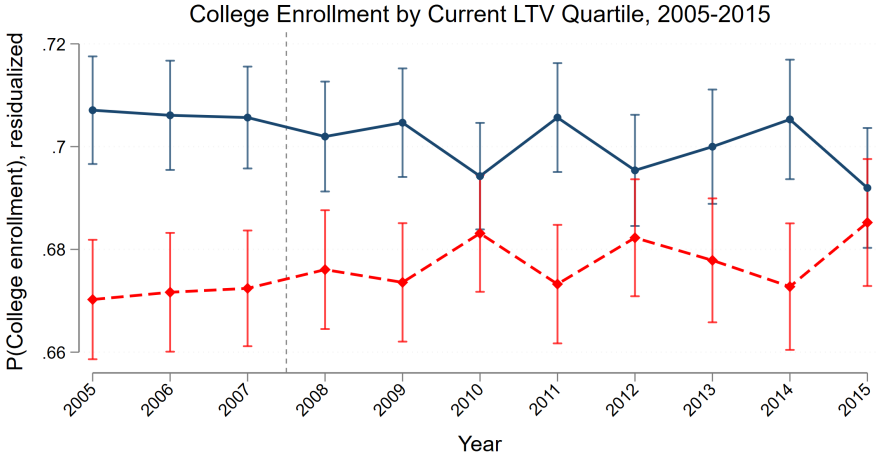
- Only first mortgage (no second liens, no HELOC, etc.)
- Assume 30-year fixed-rate mortgage.
- No refinancing in the imputed balance.
- Validate ACS-implied equity against SCF among mortgagors.



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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.

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

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

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

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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***		6.645	0.027***		-1.130
	(0.003)		(8.417)	(0.003)		(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

Appendix: HPI Effects Relative to Renters

	Child college	N	Parent extraction	N
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[\text{Mortgagor}]$	0.082***	90856	-0.041**	90901
	(0.029)		(0.017)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[\text{Outright homeowner}]$	0.034	33572		
	(0.045)			
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[LTV_{t-1} < 0.8]$	0.094***	89259	0.006	89302
	(0.031)		(0.019)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[LTV_{t-1} > 0.8]$	0.030	89259	-0.169***	89302
	(0.036)		(0.025)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[LTV_{t-1} \notin Q4]$	0.098***	89259	0.011	89302
	(0.031)		(0.020)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[LTV_{t-1} \in Q4]$	0.042	89259	-0.143***	89302
	(0.036)		(0.024)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[\text{moved} > 3\text{yrs}]$	0.087***	90856	-0.046**	90901
	(0.030)		(0.018)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[\text{moved} \leq 3\text{yrs}]$	0.065	90856	0.026	90901
	(0.041)		(0.031)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[\text{Extracted}]$	0.132***	90856	0.000***	90901
	(0.036)		(0.000)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[\text{Not extracted}]$	0.067**	90856	0.000***	90901
	(0.031)		(0.000)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[DSR \leq p50_t]$	0.099***	90856	0.038*	90901
	(0.034)		(0.022)	
$\Delta_{2006,t-1} \ln HPI \times \mathbf{1}[DSR > p50_t]$	0.075**	90856	0.034	90901
	(0.032)		(0.022)	
Demographic controls	Yes		Yes	
PUMA × 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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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.