

Habit Formation, Heterogeneity, and Housing Wealth Effects Across U.S. States

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- Response of consumption to fluctuations in housing wealth has received considerable attention recently in the academic, financial, and popular press
- Emerging stylized facts
 - During the past decade, U.S. has experienced rising real housing prices coupled with declining personal savings
 - Housing wealth effects are sizable (greater than stock wealth effects?) and played a role in mitigating the 2001 recession
 - Increases in housing prices and housing wealth have been unevenly distributed across U.S. regions

- Academic literature has recently identified housing wealth as an important determinant of consumption, even more so than stock market wealth
 - Benjamin et al. (2004) use aggregate U.S. data and a cointegration approach and find a larger housing wealth than stock wealth effect on consumption
 - Using a panel of U.S. states, Case et al. (2005) compare housing and stock wealth effects and find larger housing wealth effects
 - Carroll et al. (2006) develop a novel methodology for measuring the short- to medium-term effects of housing and stock market wealth on consumption and find a stronger housing wealth effect in aggregate U.S. data

- Important drawback to these studies
 - Employ aggregate U.S. data (Benjamin et al., 2004; Carroll et al., 2006) or make homogeneity assumptions (Case et al., 2005) that mask important differences in behavior across U.S. regions
- Recent micro studies by Lehnert (2004) and Campbell and Cocco (2007) indicate important differences in the magnitude of housing wealth effects across demographic groups
- However, there are potential drawbacks to micro studies
 - Often rely on food expenditures as a proxy for consumption
 - Time-series observations are limited in their span and frequency

- Our heterogeneous panel methodology represents a “third way” for estimating housing and stock wealth effects on consumption
- We use U.S. state-level data and do *not* impose homogeneity restrictions in parameters across states
 - This helps to alleviate aggregation and homogeneity biases that potentially plague Benjamin et al. (2004), Case et al. (2005), and Carroll et al. (2006)
 - Relative to micro studies, we use more reliable measures of consumption and have time-series observations with higher frequency and longer span
- We obtain efficiency gains in our heterogeneous panel methodology by exploiting the contemporaneous correlation of shocks across states

- Preview of empirical results
 - Housing wealth effects vary substantially across states
 - Differences in demographics across states help to explain differences in housing wealth effects across
 - Housing wealth effect is generally larger than the stock market wealth effect states

Theoretical Framework

- Representative consumer
 - $\max_{\{C_t\}} E_t[\sum_{t=s}^{\infty} \beta^{t-s} u(C_t, C_{t-1})]$
- Muellbauer (1988) utility function
 - $u(C_t, C_{t-1}) = (C_t - \chi C_{t-1})^{1-\rho} / (1 - \rho)$
 - Parameter χ incorporates habits
 - When $\chi = 0$, habits play no role
 - Intuition: $\uparrow C_{t-1} \Rightarrow \uparrow$ stock of habits $\Rightarrow \downarrow$ utility in the present
- Conventional budget constraint
 - $A_t = R(A_{t-1} + Y_{t-1} - C_{t-1})$
- Dynan (2000) derives approximate Euler equation
 - $\Delta \log C_t = c_0 + \chi \Delta \log C_{t-1} + \epsilon_t$
 - ϵ_t captures effects of all shocks to consumption growth, including wealth shocks

- Sommer (2007)
 - Consider estimating $\Delta \log C_t = c_0 + \chi \Delta \log C_{t-1} + \epsilon_t$
 - Transitory measurement error and elements of spending not included in the theory cause ϵ_t to have an MA(1) structure with a negative MA coefficient
 - Leads to a \downarrow bias in the estimate of χ
 - Instruments dated $t - 2$ and earlier are valid
 - Using aggregate U.S. data, IV estimates of χ are near 0.70
- We use the basic framework of Carroll et al. (2006; COS)—which builds on Sommer (2007)—for a panel of U.S. state-level data

- COS point out that estimating a model in growth rates is not conducive to estimating the MPC out of wealth, especially when we want to compare wealth effects across asset categories
- Similar to COS, we use ratios of changes in consumption and wealth relative to an initial level of consumption
 - $\partial C_{i,t} = (C_{i,t} - C_{i,t-1})/C_{i,t-3}$
 - $\partial W_{i,t-1}^j = (W_{i,t}^j - W_{i,t-1}^j)/C_{i,t-3}$
 - $C_{i,t}$ is consumption for state i
 - $W_{i,t}^j$ is real wealth for asset j and state i
 - Modified Euler equation: $\partial C_{i,t} = c_{i,0} + \chi_i \partial C_{i,t-1} + \epsilon_{i,t}$

Econometric Framework

- IV approach to estimate the short-run and long-run MPCs out of stock market and housing wealth
- As observed by COS, this is a situation where the first-stage regression is as interesting as the second-stage regression!
- First-stage regression
 - $\partial C_{i,t-1} = \alpha_{i,0} + \alpha_{i,H} \partial W_{i,t-2}^H + \alpha_{i,S} \partial W_{i,t-2}^S + \gamma_{i,1} \Delta R_{t-2} + \gamma_{i,2} X_{t-2} + \gamma_{i,3} \Delta U_{i,t-2} + u_{i,t-1}$
 - $W_{i,t}^H$ is real housing wealth for state i
 - $W_{i,t}^S$ is real stock market wealth for state i
 - R_t is the yield on a 3-month Treasury bill
 - X_t is an index of consumer expectations
 - $U_{i,t}$ is the unemployment rate for state i
- $\hat{\alpha}_{i,H}$ and $\hat{\alpha}_{i,S}$ are estimates of the one-period lagged MPCs out of housing and stock market wealth, respectively

- Second-stage regression

- Estimate $C_{i,t} = c_{i,0} + \chi_i C_{i,t-1} + \epsilon_{i,t}$ using the instrument set $Z_{i,t-2} = (W_{i,t-2}^H, W_{i,t-2}^S, R_{t-2}, X_{t-2}, U_{i,t-2})'$
- Using ideas in Telser (1964) and Qian and Schmidt (1997, 1999), we obtain more efficient estimates of χ_i using the following “augmented IV” procedure
 - Estimate $C_{i,t} = c_{i,0} + \chi_i C_{i,t-1} + \epsilon_{i,t}$ using the instrument set $Z_{i,t-2}$ and save the residuals, $\hat{\epsilon}_{i,t}$, $i = 1, \dots, N$
 - Estimate $C_{i,t} = c_{i,0} + \chi_i C_{i,t-1} + f_{i,t}^\epsilon + \epsilon_{i,t}$ using the instrument set $(Z_{i,t-2}', f_{i,t}^\epsilon)'$, where $f_{i,t}^\epsilon$ is the first principal component of $\hat{\epsilon}_{p,t}$, $p = 1, \dots, i-1, i+1, \dots, N$
 - Computationally simpler than SUR (3SLS)—given that $N = 51$ in our application—but still allows sizable efficiency gains
 - We use a similar procedure to generate more efficient estimates of $\alpha_{i,H}$ and $\alpha_{i,S}$ in the first-stage regression

- With estimates of $\alpha_{i,H}$, $\alpha_{i,S}$, and χ_i in hand, we can estimate the short-run (contemporaneous) and long-run (infinite-horizon) MPCs out of housing and stock market wealth
 - Short-run MPC: $\hat{\alpha}_{i,j}^0 = \hat{\alpha}_{i,j}/\hat{\chi}_i, j = H, S$
 - Long-run MPC: $\hat{\alpha}_{i,j}^{LR} = \hat{\alpha}_{i,j}/[\hat{\chi}_i(1 - \hat{\chi}_i)], j = H, S$
- COS argue that the notion of a “long-run” MPC is not necessarily well-defined theoretically and actually interpret the long-run MPC as a “medium-term” MPC with a horizon that is relevant for policymakers

- Drawback to COS approach
 - Given that $\hat{\alpha}_{i,j}$ and $\hat{\chi}_i$ are estimated separately, we do not readily obtain an estimate of the covariance between the $\hat{\alpha}_{i,j}$ and $\hat{\chi}_i$ estimates, and this covariance is necessary to compute standard errors for $\hat{\alpha}_{i,j}^0$ and $\hat{\alpha}_{i,j}^{LR}$ using the delta method
 - COS do not report standard errors for these MPCs in their application to aggregate U.S. data
- To get a feel for the degree of sampling variability, we compute standard errors for $\hat{\alpha}_{i,j}^0$ and $\hat{\alpha}_{i,j}^{LR}$ using a grid of assumed values for the correlation between $\hat{\alpha}_{i,j}$ and $\hat{\chi}_i$ in the interval $[-1, 1]$ and report results for a grid value that gives relatively conservative standard errors

- Sample period: 1977:2–2005:2 (based on data availability)
- State-level consumption data are not available
 - State-level retail sales (from Economy.com) serve as the proxy for state-level consumption
 - Case et al. (2005), among others, use this proxy
- State-level housing wealth is computed using the state-level OFHEO housing price series and the state-level quantity of housing
- State-level stock market wealth is computed using the S&P 500 market capitalization (from Global Financial Data) and and state-level dividend income (from the BEA)
 - Stock market wealth for state i is state i 's proportion of total dividend income times the S&P 500 market capitalization
- Consumption, housing wealth, and stock wealth are converted to real terms using the PCE deflator

- Additional instruments
 - 3-month Treasury bill rate (from FRED)
 - Index of consumer expectations (from the Conference Board)
 - State-level unemployment rates (from the BLS)

- Table 1 reports first-stage regression results
- Instruments do not appear overly “weak”
- Housing wealth effects are quite variable across states
- Housing wealth effects are “strong” in a number of states
- Statistically significant difference in housing and stock wealth effects for 12 states at the 5% level
 - AZ, DC, FL, LA, MA, MD, NH, NJ, NM, NY, TX, WI

Empirical Results: Table 1

Table 1: First-Stage Regression Results

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	OLS estimation		Augmented OLS estimation					
State	R^2	F -stat.	$\hat{\alpha}_{i,H}$	$\hat{\alpha}_{i,S}$	$\alpha_{i,H} = \alpha_{i,S}$	R^2	F -stat.	
AK	0.027	0.572	0.007 (0.013)	-0.008 (0.010)	0.787	0.495	16.805**	
AL	0.265	7.494**	0.023* (0.012)	-0.008 (0.011)	3.103 [†]	0.868	112.980**	
AR	0.084	1.898	-0.014 (0.011)	0.030* (0.017)	3.160 [†]	0.817	76.537**	
AZ	0.119	2.798*	0.038** (0.015)	0.003 (0.005)	4.991*	0.868	113.063**	
CA	0.186	4.768**	0.023** (0.005)	0.015** (0.003)	1.782	0.936	251.606**	
CO	0.109	2.542	0.009 (0.018)	0.021** (0.006)	0.379	0.851	98.080**	
CT	0.201	5.228**	0.063** (0.019)	0.027** (0.009)	3.132 [†]	0.740	48.953**	
DC	0.199	5.172**	0.023** (0.006)	0.001 (0.004)	16.795**	0.743	49.663**	
DE	0.101	2.339*	0.027* (0.014)	0.019** (0.006)	0.252	0.834	86.197**	
FL	0.075	1.696	0.067** (0.013)	0.007* (0.003)	19.508**	0.870	114.524**	
GA	0.135	3.233**	0.049** (0.021)	0.020** (0.007)	1.604	0.898	151.250**	
HI	0.034	0.743	0.003 (0.003)	0.013 (0.015)	0.463	0.587	24.382**	
IA	0.113	2.648*	0.017 [†] (0.013)	0.002 (0.009)	0.782	0.864	109.224**	
ID	0.243	6.685**	0.002 (0.006)	0.006 [†] (0.004)	0.252	0.816	76.349**	
IL	0.134	3.227*	0.025* (0.011)	0.011** (0.002)	1.581	0.953	347.147**	
IN	0.115	2.692*	0.049** (0.017)	0.015** (0.005)	3.478 [†]	0.922	201.772**	
KS	0.103	2.378*	0.005 (0.010)	0.003 (0.006)	0.023	0.888	136.111**	
KY	0.131	3.142*	0.007 (0.009)	0.019* (0.010)	0.568	0.906	164.994**	
LA	0.075	1.698	0.038* (0.019)	-0.006 (0.008)	4.205**	0.779	60.371**	
MA	0.157	3.868**	0.096** (0.019)	0.030** (0.012)	10.378**	0.799	68.387**	
MD	0.156	3.832**	0.033* (0.015)	0.004 (0.006)	3.964*	0.802	69.682**	
ME	0.128	3.066**	0.023 [†] (0.016)	0.022** (0.009)	0.003	0.789	64.018**	
MI	0.228	6.157**	0.010 (0.013)	0.017** (0.004)	0.240	0.925	211.077**	
MN	0.139	3.348**	0.001 (0.018)	0.028* (0.012)	1.069	0.849	96.539**	
MO	0.091	2.079 [†]	0.005 (0.010)	0.003 (0.003)	0.030	0.908	170.427**	
MS	0.107	2.484*	0.006** (0.003)	0.007 (0.006)	0.022	0.928	220.748**	
MT	0.067	1.490	0.005 (0.004)	-0.005 (0.008)	1.061	0.748	50.950**	
NC	0.103	2.396*	0.032 (0.026)	0.014** (0.005)	0.439	0.906	164.721**	
ND	0.065	1.447	0.007 (0.009)	-0.010 (0.012)	1.481	0.690	38.136**	
NE	0.100	2.317*	0.038* (0.018)	-0.010 (0.012)	3.532 [†]	0.750	51.427**	
NH	0.194	5.017**	0.076** (0.032)	0.013* (0.007)	4.508**	0.783	61.838**	

Notes: [†], *, and ** indicate significance at the 10%, 5%, and 1% levels, respectively; 0.000 indicates less than 0.0005 in absolute value. Columns (2) and (7) report the R^2 measure for the first-stage regression model. Columns (3) and (8) report the F -statistic corresponding to the joint significance of all of the regressors in the first-stage regression model. Columns (4) and (5) report estimates of $\alpha_{i,H}$ and $\alpha_{i,S}$ for the first-stage regression model; standard errors are reported in parentheses; significance levels in columns (4) and (5) correspond to a one-sided (upper-tail) test. Column (6) reports the Wald statistic corresponding to the null hypothesis that $\alpha_{i,H} = \alpha_{i,S}$.



Empirical Results: Table 1

Table 1 (continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS estimation		Augmented OLS estimation				
State	R^2	F -stat.	$\hat{\alpha}_{i,H}$	$\hat{\alpha}_{i,S}$	$\alpha_{i,H} = \alpha_{i,S}$	R^2	F -stat.
NJ	0.141	3.404**	0.047** (0.016)	0.005 (0.007)	7.187**	0.864	109.359**
NM	0.115	2.709*	0.024** (0.009)	-0.003 (0.008)	5.226*	0.828	82.912**
NV	0.181	4.592**	0.044** (0.010)	0.021** (0.007)	3.789 ^l	0.832	85.001**
NY	0.096	2.216 ^l	0.034** (0.011)	0.008** (0.003)	5.835*	0.870	114.648**
OH	0.161	3.981**	0.029 ^l (0.019)	0.018** (0.007)	0.242	0.905	164.468**
OK	0.028	0.607	0.030 (0.029)	-0.013 (0.011)	1.912	0.637	30.111**
OR	0.214	5.676**	0.027** (0.013)	0.023** (0.008)	0.042	0.869	113.671**
PA	0.135	3.259**	0.023* (0.011)	0.005 ^l (0.003)	2.459	0.918	193.445**
RI	0.120	2.842*	0.050** (0.016)	0.028* (0.017)	1.039	0.620	27.977**
SC	0.083	1.878	0.014 (0.013)	0.002 (0.008)	0.476	0.873	117.764**
SD	0.058	1.285	0.005 (0.005)	0.016 (0.014)	0.554	0.562	22.038**
TN	0.181	4.597**	0.017 ^l (0.013)	0.014** (0.005)	0.072	0.914	181.922**
TX	0.086	1.969 ^l	0.064** (0.018)	0.005 (0.008)	8.712**	0.812	74.068**
UT	0.147	3.586**	0.037* (0.018)	0.007 (0.010)	1.838	0.795	66.493**
VA	0.129	3.091*	0.040** (0.012)	0.019** (0.006)	2.609	0.902	158.151**
VT	0.111	2.597*	0.022 ^l (0.014)	-0.003 (0.010)	2.523	0.791	64.836**
WA	0.192	4.935**	0.043** (0.017)	0.017** (0.007)	1.802	0.806	71.290**
WI	0.160	3.953**	0.034** (0.008)	0.013** (0.004)	6.191**	0.916	188.064**
WV	0.136	3.281**	0.000 (0.002)	-0.004 (0.006)	0.393	0.917	189.726**
WY	0.087	1.991 ^l	0.027* (0.016)	-0.011 (0.013)	3.201 ^l	0.517	18.405**
Mean	0.128		0.028	0.009		0.817	
Median	0.120		0.025	0.008		0.849	
Min.	0.027		-0.014	-0.013		0.495	
Max.	0.265		0.096	0.030		0.953	
Stan. dev.	0.054		0.022	0.012		0.110	
# > 0			50	40			
# sig. (5%)		37	29	25	12		51

Summary statistics for wealth effects in Table 1

	$\hat{\alpha}_{i,H}$	$\hat{\alpha}_{i,S}$
Mean	0.028	0.009
Median	0.025	0.008
Min.	-0.014	-0.013
Max.	0.096	0.030
Stan. dev.	0.022	0.012
# > 0	50	40
# sig. (5%)	29	25

- Table 2 reports estimates of χ_i , $\alpha_{i,j}^0$, $\alpha_{i,j}^{LR}$ for $j = H, S$
- Estimates of χ_i centered very near to the Sommers (2007) estimate
- Contemporaneous and long-run housing wealth effects are relatively large in a number of states
- Housing wealth effects are typically greater than the stock wealth effects

Empirical Results: Table 2

Table 2: Estimates of χ_i and Contemporaneous and Long-Run Wealth Effects

(1)	(2)	(3)	(4)	(5)	(6)
State	$\hat{\chi}_i$	$\hat{\alpha}_{i,H}^0$	$\hat{\alpha}_{i,H}^{LR}$	$\hat{\alpha}_{i,S}^0$	$\hat{\alpha}_{i,S}^{LR}$
AK	1.308** (0.506)	0.005 (0.009)	-0.017 (0.030)	-0.006 (0.009)	0.020 (0.059)
AL	0.700** (0.041)	0.033* (0.016)	0.109* (0.063)	-0.011 (0.016)	-0.038 (0.051)
AR	0.649** (0.060)	-0.022 (0.018)	-0.061 (0.046)	0.046* (0.024)	0.132 [†] (0.081)
AZ	0.765** (0.081)	0.050** (0.017)	0.211* (0.121)	0.004 (0.006)	0.017 (0.030)
CA	0.738** (0.052)	0.031** (0.006)	0.119** (0.037)	0.020** (0.003)	0.078** (0.023)
CO	0.599** (0.087)	0.015 (0.029)	0.037 (0.077)	0.035** (0.008)	0.087** (0.029)
CT	0.798** (0.081)	0.079** (0.020)	0.391** (0.210)	0.034** (0.010)	0.168* (0.095)
DC	0.858** (0.113)	0.027** (0.006)	0.189 (0.160)	0.001 (0.005)	0.008 (0.036)
DE	0.697** (0.089)	0.039* (0.018)	0.128 [†] (0.081)	0.027** (0.007)	0.090* (0.039)
FL	0.717** (0.108)	0.093** (0.015)	0.330** (0.126)	0.010** (0.004)	0.035* (0.021)
GA	0.604** (0.047)	0.081** (0.031)	0.205* (0.093)	0.033** (0.010)	0.084** (0.031)
HI	0.539** (0.239)	0.006 (0.005)	0.012 (0.013)	0.024 (0.023)	0.052 (0.063)
IA	0.710** (0.058)	0.024 [†] (0.017)	0.083 (0.069)	0.003 (0.013)	0.010 (0.044)
ID	0.780** (0.056)	0.003 (0.008)	0.012 (0.036)	0.008 [†] (0.005)	0.035 (0.028)
IL	0.659** (0.031)	0.038** (0.016)	0.111* (0.052)	0.017** (0.003)	0.049** (0.010)
IN	0.656** (0.056)	0.075** (0.023)	0.217** (0.086)	0.023** (0.007)	0.066** (0.026)
KS	0.564** (0.073)	0.009 (0.017)	0.020 (0.041)	0.005 (0.010)	0.012 (0.025)
KY	0.665** (0.066)	0.011 (0.013)	0.031 (0.042)	0.029* (0.014)	0.085* (0.050)
LA	0.600** (0.112)	0.063** (0.026)	0.158* (0.089)	-0.010 (0.015)	-0.025 (0.032)
MA	0.804** (0.082)	0.119** (0.019)	0.610* (0.282)	0.037** (0.013)	0.191 [†] (0.122)
MD	0.672** (0.086)	0.049** (0.019)	0.150* (0.082)	0.006 (0.008)	0.018 (0.029)
ME	0.641** (0.069)	0.036 [†] (0.023)	0.100 [†] (0.075)	0.034** (0.012)	0.096* (0.044)
MI	0.751** (0.040)	0.013 (0.017)	0.054 (0.073)	0.023** (0.005)	0.091** (0.028)
MN	0.668** (0.069)	0.001 (0.027)	0.005 (0.081)	0.042** (0.016)	0.126* (0.063)
MO	0.607** (0.093)	0.008 (0.016)	0.021 (0.043)	0.005 (0.005)	0.013 (0.013)
MS	0.664** (0.046)	0.009* (0.004)	0.027* (0.015)	0.011 (0.009)	0.031 (0.028)
MT	0.634** (0.111)	0.008 [†] (0.006)	0.022 (0.019)	-0.008 (0.013)	-0.022 (0.033)
NC	0.604** (0.070)	0.053 [†] (0.040)	0.134 (0.114)	0.023** (0.007)	0.059** (0.023)
ND	0.863** (0.178)	0.008 (0.010)	0.059 (0.126)	-0.012 (0.015)	-0.084 (0.087)
NE	0.763** (0.104)	0.050** (0.020)	0.210 [†] (0.147)	-0.013 (0.017)	-0.055 (0.058)
NH	0.795** (0.075)	0.096** (0.036)	0.467 [†] (0.291)	0.016* (0.008)	0.080 [†] (0.059)

Notes: [†], *, and ** indicate significance at the 10%, 5%, and 1% levels, respectively; 0.000 indicates less than 0.0005 in absolute value. Column (2)-6 report augmented IV estimates of the indicated parameter; standard errors are reported in parentheses; significance levels in columns (2)-(6) correspond to a one-sided (upper-tail) test. The summary statistics at the bottom of the table exclude AK.

Empirical Results: Table 2

Table 2 (continued)

(1)	(2)	(3)	(4)	(5)	(6)
State	$\hat{\chi}_i$	$\hat{\alpha}_{i,H}^0$	$\hat{\alpha}_{i,H}^{LR}$	$\hat{\alpha}_{i,S}^0$	$\hat{\alpha}_{i,S}^{LR}$
NJ	0.792** (0.094)	0.059** (0.017)	0.285* (0.172)	0.006 (0.008)	0.030 (0.049)
NM	0.642** (0.091)	0.037** (0.012)	0.104* (0.047)	-0.005 (0.013)	-0.013 (0.034)
NV	0.818** (0.071)	0.054** (0.010)	0.295* (0.141)	0.026** (0.007)	0.141* (0.080)
NY	0.716** (0.086)	0.047** (0.013)	0.167* (0.076)	0.011** (0.004)	0.039* (0.020)
OH	0.712** (0.037)	0.041 [†] (0.025)	0.142 [†] (0.100)	0.025** (0.009)	0.088* (0.039)
OK	0.615** (0.182)	0.049 (0.040)	0.127 (0.137)	-0.021 (0.022)	-0.055 (0.041)
OR	0.724** (0.038)	0.037* (0.017)	0.135* (0.073)	0.032** (0.010)	0.115** (0.047)
PA	0.635** (0.054)	0.036* (0.016)	0.099* (0.051)	0.008* (0.004)	0.022 [†] (0.014)
RI	0.676** (0.116)	0.074** (0.019)	0.228* (0.104)	0.041* (0.022)	0.128 [†] (0.094)
SC	0.656** (0.071)	0.021 (0.019)	0.062 (0.061)	0.003 (0.012)	0.009 (0.036)
SD	0.674** (0.135)	0.007 (0.007)	0.023 (0.026)	0.024 [†] (0.018)	0.073 (0.074)
TN	0.677** (0.053)	0.025 [†] (0.018)	0.078 (0.064)	0.021** (0.007)	0.064** (0.027)
TX	0.655** (0.124)	0.098** (0.022)	0.283** (0.115)	0.008 (0.011)	0.022 (0.038)
UT	0.700** (0.041)	0.053* (0.024)	0.176* (0.095)	0.010 (0.014)	0.033 (0.049)
VA	0.690** (0.052)	0.058** (0.015)	0.187** (0.068)	0.028** (0.008)	0.089** (0.034)
VT	0.800** (0.139)	0.027* (0.015)	0.138 (0.143)	-0.004 (0.013)	-0.019 (0.057)
WA	0.661** (0.086)	0.065** (0.022)	0.192* (0.092)	0.026** (0.009)	0.076* (0.038)
WI	0.695** (0.037)	0.049** (0.010)	0.161** (0.045)	0.019** (0.005)	0.061** (0.022)
WV	0.725** (0.073)	0.000 (0.003)	0.000 (0.010)	-0.006 (0.009)	-0.020 (0.028)
WY	0.863** (0.186)	0.031* (0.015)	0.228 (0.359)	-0.013 (0.017)	-0.093 (0.097)
Mean	0.698	0.039	0.145	0.014	0.046
Median	0.683	0.037	0.131	0.014	0.044
Min.	0.539	-0.022	-0.061	-0.021	-0.093
Max.	0.863	0.12	0.610	0.046	0.19
Stan. dev.	0.077	0.030	0.126	0.017	0.061
# > 0	50	49	49	40	40
# sig. (5%)	50	30	24	26	21

Empirical Results: Table 2

Summary statistics for wealth effects in Table 2 (AK excluded)

	$\hat{\chi}_i$	$\hat{\alpha}_{i,H}^0$	$\hat{\alpha}_{i,H}^{LR}$	$\hat{\alpha}_{i,S}^0$	$\hat{\alpha}_{i,S}^{LR}$
Mean	0.698	0.039	0.145	0.014	0.046
Median	0.683	0.037	0.141	0.014	0.044
Min.	0.539	-0.022	-0.061	-0.021	-0.093
Max.	0.863	0.120	0.610	0.046	0.190
Stan. dev.	0.077	0.030	0.126	0.017	0.061
# > 0	50	49	49	40	40
# sig. (5%)	50	30	24	26	21

Empirical Results

- Motivated by Lehnert (2004), we explore the role of age demographic differences across states in explaining variations in housing wealth effects across states
- We also consider the role of housing wealth volatility
 - Highly volatile housing price growth makes it more difficult for households to distinguish between temporary and permanent increases in housing wealth
- Table 3 reports cross-section regression results for $\hat{\alpha}_{i,H}$ and $\hat{\alpha}_{i,H}^{LR}$
- Results for age demographics are in line with Lehnert (2004)
 - Positive effects for younger households due to liquidity constraints
 - Positive effects for oldest households who are “cashing out” housing wealth

Empirical Results: Table 3

Wealth effects cross-section regression results

25–34	35–44	45–54	55–64	65–84	<i>H</i> vol.	R^2
A. $\hat{\alpha}_{i,H}$						
0.004 (0.003)	0.013** (0.005)	-0.005 (0.006)	-0.008 (0.008)	0.006* (0.003)	-0.325** (0.089)	0.342
B. $\hat{\alpha}_{i,H}^{LR}$						
0.023† (0.017)	0.080* (0.033)	-0.018 (0.034)	-0.043 (0.051)	0.031 (0.022)	-1.172† (0.639)	0.293

Conclusion

- Housing wealth effects vary substantially across U.S. states
 - Using aggregate data or assuming homogeneity can mask important heterogeneities in housing wealth effects
 - Differences in age demographics and housing wealth volatility help to account for differences in housing wealth effects across states
- Housing wealth effects are statistically and economically important in a number of states
- Housing wealth effects are generally larger than stock market wealth effects