Housing Wealth Across Countries: The Role of Expectations, Institutions and Preferences

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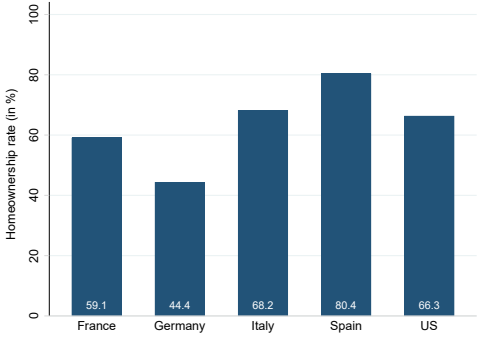
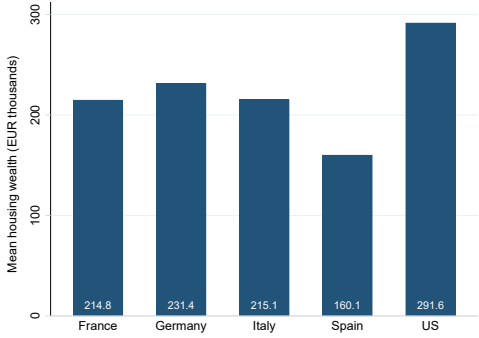
The views are those of the authors, and do not necessarily reflect those of the European Central Bank or the European Commission.

Striking differences in housing wealth across countries

Extensive margin: home-ownership rate (%)

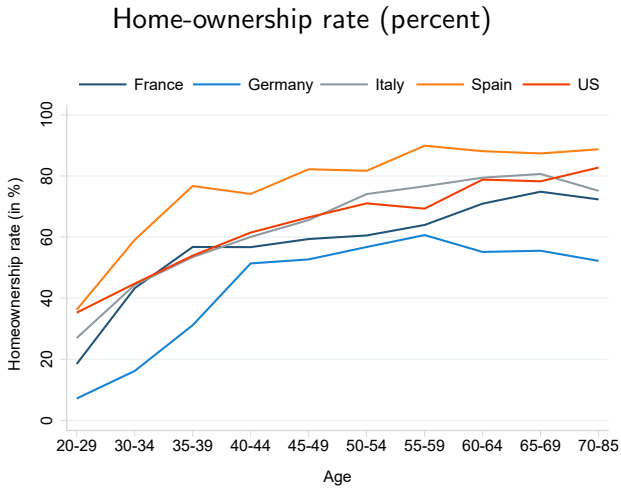


Intensive margin: mean housing wealth (EUR)



Source: Eurosystem Household Finance and Consumption Survey 2014; Survey of Consumer Finances 2016.

Differences in home-ownership persist over life cycle
∼30 pp gap between Germany and Spain



Source: Eurosystem Household Finance and Consumption Survey 2014; US Survey of Consumer Finances 2016.

Preview: Decomposing cross-country differences in housing

1. **Estimate in micro data from 5 countries life cycle model w illiquid housing**
   - Discrete house owning–renting choice
   - Illiquid housing (continuous size, subject to adjustment cost)
   - Collateral constraints
   - Stochastic house prices (real, rel to nonhousing, permanent shocks): $\pi_t = G\eta_t\pi_{t-1}$
   - Permanent–transitory income process: $Y_{it} = \theta_{it}P_{it}, \quad P_{it} = \Gamma_j\psi_{it}P_{it-1}$
   - Allows for some heterogeneity in preferences (impatience) and house price beliefs
2. **Systematically quantify drivers of differences in extensive and intensive margins of housing: home-ownership and € value of housing wealth**
   - (i) House price beliefs (mean, variance)
   - (ii) Housing market institutions (transaction costs, rental wedge, collateral constraints)
   - (iii) Preferences (discount factor, weight of housing, bequest motive)
3. **Takeaways: Drivers of housing**
   - (i) Rental wedge and HP beliefs matter for home-ownership (extensive margin)
   - (ii) Maintenance costs matter for housing wealth of owners (€ value, intensive margin)

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Literature review

- **Modeling housing:** Typically single country (or two)
  Cocco 2005, Yao & Zhang 2005, **Li & Yao 2007,** Li et al 2016, Attanasio et al 2012, Landvoigt 2017, Kindermann & Kohls 2018, Hintermaier & Koeniger 2018
- **House price beliefs:** Little work connecting data and structural models
  Adelino et al 2018, Ben-David et al 2018, Kuchler & Zafar 2019, Kindermann et al 2021, Kaplan et al 2020, Giglio et al 2021, Li et al 2023
- **Housing market institutions:** Often reduced-form
  Chiuri & Jappelli 2003, Chambers et al 2009, Calza et al 2013, Kaas et al 2021 ...
- **Preference heterogeneity:** Impatience
  Calvet et al 2019, Epper et al 2020, Krueger et al 2016, Aguiar et al 2023, ...
- **Solution method:** Endogenous grid method (EGM)
  Carroll 2006, Iskhakov et al 2017, ...

'Canonical' model of housing, normalized problem (ratios of perm income P)

Budget constraints and value functions depend on (discrete) housing status d: R, S, M

$$v_j(m_t, \overline{h}_t) = \max_{\{c_t, h_t, d_t\}} \left\{ U(c_t, h_t) + \underbrace{(1 - \mathrm{D}_j)}_{\text{Mortality}} \beta \mathbf{E}_t \left[v_{j+1}(m_{t+1}, \overline{h}_{t+1}) \left(\frac{\Gamma_{j+1}\psi_{t+1}}{(G\eta_{t+1})^{\omega}} \right)^{1-\rho} \right] + \mathrm{D}_j B(\widehat{w}_t) \right\}$$

state vars: m, house owned $\overline{h}$, (house price π, perm inc P)

s.t.

$$a_t = \begin{cases} m_t + (1-\phi)\overline{h}_t - c_t - \widehat{\alpha} h_t & \text{if } d_t = 0 \quad \textbf{Renter (R)} \\ m_t - c_t - \lambda h_t, \quad h_t = \overline{h}_t & \text{if } d_t = 1 \quad \textbf{Stayer (S)} \\ m_t + (1-\phi)\overline{h}_t - c_t - (1+\lambda) h_t & \text{if } d_t = 2 \quad \textbf{Mover (M)} \end{cases}$$

m: liquid mkt resources, $\overline{h}$: house owned ($= 0$ for renter), h: new house to live in (buy or rent)

$\widehat{\alpha}$: rental cost, λ: maintenance costs, ϕ: selling cost, δ: downpayment, η: house price shocks

$$m_{t+1} = \frac{R}{\Gamma_{j+1}\psi_{t+1}} a_t + \theta_{t+1} \quad \text{Housing: } \overline{h}_{t+1} = \frac{G\eta_{t+1}}{\Gamma_{j+1}\psi_{t+1}} \widehat{h}_t \quad \text{for } \widehat{h}_t = \mathbf{1}(d_t > 0) h_t$$

Collateral constr: $0 \leq a_t + (1-\delta)\widehat{h}_t$; Norm: $m \equiv M/P, h \equiv H\pi/P, v \equiv V/(P/\pi^{\omega})^{1-\rho}$

Non-norm

Model—House price beliefs

$$v_j(\,\cdot\,) = \max_{\{c_t, h_t, d_t\}} \left\{ U(c_t, h_t) + (1 - \mathrm{D}_j)\beta\, \mathbf{E}_t \left[v_{j+1}(\,\cdot\,) \left(\frac{\Gamma_{j+1}\psi_{t+1}}{(G\eta_{t+1})^{\omega}} \right)^{1-\rho} \right] + \mathrm{D}_j B(\widehat{w}_t) \right\}$$

Actual house prices π and house price beliefs $\widehat{G}$

- House prices follow geometric random walk: $\pi_t = G\eta_t\pi_{t-1}$

  Housing of homeowners risky, subject to HP shocks η_{t+1}: $\overline{h}_{t+1} = \frac{G\eta_{t+1}}{\Gamma_{j+1}\psi_{t+1}}\widehat{h}_t$

- Households (permanently) differ in beliefs about HP growth:

$$\widehat{G}_i = \grave{G} + \widetilde{G}\epsilon_{i1}, \qquad \epsilon_{i1} \sim \text{Uniform}\big([-1, 1]\big)$$

Model—Preferences

$$v_j(\,\cdot\,) = \max_{\{c_t, h_t, d_t\}} \left\{ U(c_t, h_t) + (1 - \mathrm{D}_j)\beta\, \mathbf{E}_t \left[v_{j+1}(\,\cdot\,) \left(\frac{\Gamma_{j+1}\psi_{t+1}}{(G\eta_{t+1})^{\omega}} \right)^{1-\rho} \right] + \mathrm{D}_j B(\widehat{w}_t) \right\}$$

Preferences

- CRRA utility over Cobb–Douglas aggregate of c and h: $U(c, h) = \dfrac{(c^{1-\omega} h^{\omega})^{1-\rho}}{1-\rho}$
- Bequest motive: $B(\cdot) = L \times \dfrac{(\cdot)^{1-\rho}}{1-\rho}$
- Discount factor heterogeneity, allows for correlation w/ HP beliefs ϵ_{i1} [estimated]:

$$\beta_i = \left(1 + \exp(\vartheta_i)\right)^{-1}, \qquad \vartheta_i = \grave{\vartheta} + \widetilde{\vartheta}\,\epsilon_{i2} + \kappa\epsilon_{i1}, \qquad \epsilon_{i2} \sim \text{Uniform}[-1, 1]$$

If $\kappa < 0 \Rightarrow$ Optimistic Hhs are more patient; homeowners accumulate more wealth

Calibration

Parameter description	Symbol	Value					Source
		Germany	France	Italy	Spain	U.S.A.	
Preferences							
CRRA coefficient	ρ	2	2	2	2	2	
House prices							
Mean growth of house prices	G	1.010	1.032	1.000	1.023	1.026	Aggregate data, 1995–2020
Std dev of growth of house prices	std(η)	0.027	0.047	0.065	0.093	0.056	Aggregate data, 1995–2020
Income processes							
Share of college graduates		0.311	0.274	0.134	0.287	0.350	HFCN (2016), Table 1.3
Household head without a college degree							
Std dev of permanent income shock	std(ψ)	0.13	0.13	0.13	0.13	0.10	EU SILC, Cocco et al. (2005)
Std dev of transitory income shock	std(θ)	0.22	0.22	0.27	0.34	0.30	EU SILC, Cocco et al. (2005)
Household head with a college degree							
Std dev of permanent income shock	std(ψ)	0.14	0.14	0.18	0.12	0.13	EU SILC, Cocco et al. (2005)
Std dev of transitory income shock	std(θ)	0.21	0.21	0.29	0.28	0.24	EU SILC, Cocco et al. (2005)
Unemployment probability	$\underline{\theta}$	0.050	0.050	0.050	0.050	0.050	
Net Unemployment replacement rate	μ_U	0.59	0.68	0.74	0.78	0.59	OECD, 2020
Net Pension replacement rate	τ	0.50	0.75	0.90	0.85	0.58	OECD, 2018
Mandatory retirement period	T	45	45	45	45	45	
Maximum life cycle period	J	65	65	65	65	65	
Survival probability	$1 - \mathrm{D}$						Human Mortality Database
Housing market institutions							
Down payment requirement	δ	0.35	0.20	0.40	0.25	0.20	EDW; ECB (2019), Chart 6
Cost of selling house (roundtrip)	ϕ	0.0783	0.120	0.120	0.110	0.0475	OECD (2012)
Risk-free interest rate	r	0.03	0.03	0.03	0.03	0.03	Aggregate data

Structural estimation

- Match model to data using method of simulated moments, country by country
- Estimate beliefs, housing market institutions, preferences:

$$\xi \equiv \{ \underbrace{\widetilde{G};}_{\text{House price beliefs}} \overbrace{\underbrace{\alpha,}_{\text{Rental wedge}} \underbrace{\lambda;}_{\text{Maintenance costs}}}^{\text{Housing market institutions}} \overbrace{\underbrace{\widetilde{\vartheta},}_{\text{Impatience}} \underbrace{\widetilde{\vartheta},}_{} \underbrace{\omega,}_{\text{Weight on housing}} \underbrace{L;}_{\text{Bequest}}}^{\text{Preferences}} \underbrace{\kappa}_{\substack{\text{Interaction} \\ \text{b/w } \vartheta \text{ and } \widehat{G}}} \}$$

- Minimize

$$\widehat{\xi} = \arg\min \left(m(x) - \widehat{m}(\widetilde{x}|\xi)\right)' \Omega^{-1} \left(m(x) - \widehat{m}(\widetilde{x}|\xi)\right)$$

$x = \{x_1, \ldots, x_N\}$ data; $m(x)$ data moments; $\widetilde{x} = \{\widetilde{x}_1, \ldots, \widetilde{x}_S\}$ S simulations from model; $\widehat{m}(\widetilde{x}|\xi) = 1/S \sum_{s=1}^{S} m(\widetilde{x}_s|\xi)$ moments simulated from model; Ω weighting matrix

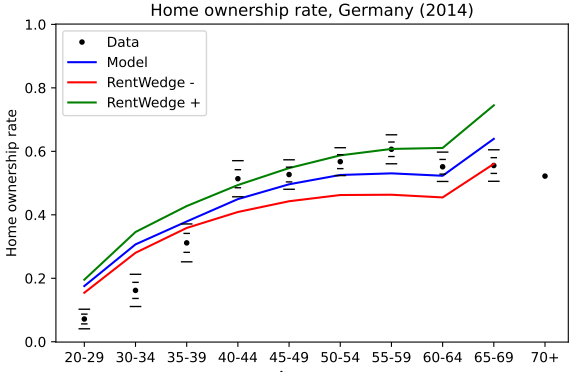
- Moments m:

home-ownership rate; mean house value–income ratio (owners); mean rent–income ratio (renters); mean, median net wealth–income ratio (owners and renters)

Identification

1. Rental wedge $\alpha \equiv$ rental cost $\widehat{\alpha}$ – maintenance costs λ: determined by level of home-ownership (higher wedge makes renting less appealing)
2. Mean house price belief $\grave{G}$: pinned by mean actual HP growth ($\sim$Rational exp)

User cost perspective: Households compare $\underbrace{r + \lambda - \grave{G}}_{\text{user cost of owning}}$ to $\underbrace{\widehat{\alpha} \equiv \underbrace{\alpha}_{\text{rental wedge}} + \lambda}_{\text{cost of renting } \widehat{\alpha}}$



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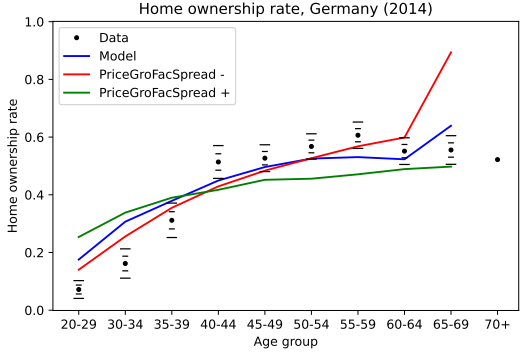
3. Spread of house price beliefs $\widetilde{G}$: determined by slope of home-ownership profile (pessimistic people buy house later in life)



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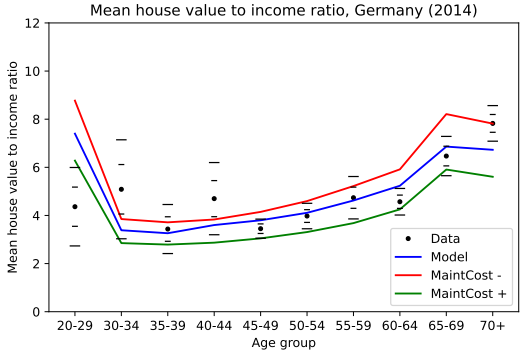
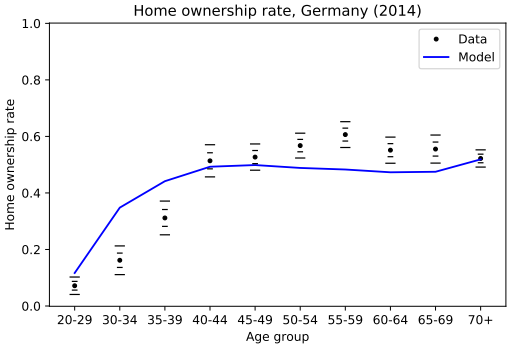
4. Maintenance costs λ: identified by housing wealth–income ratio (cond. on owning)

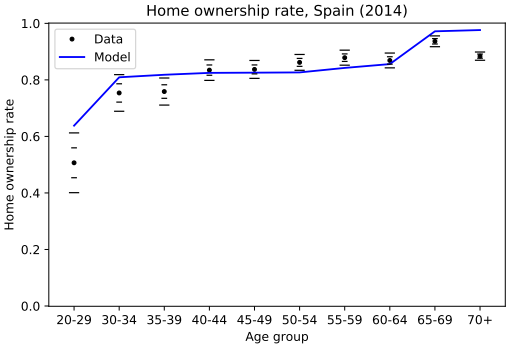


Estimates

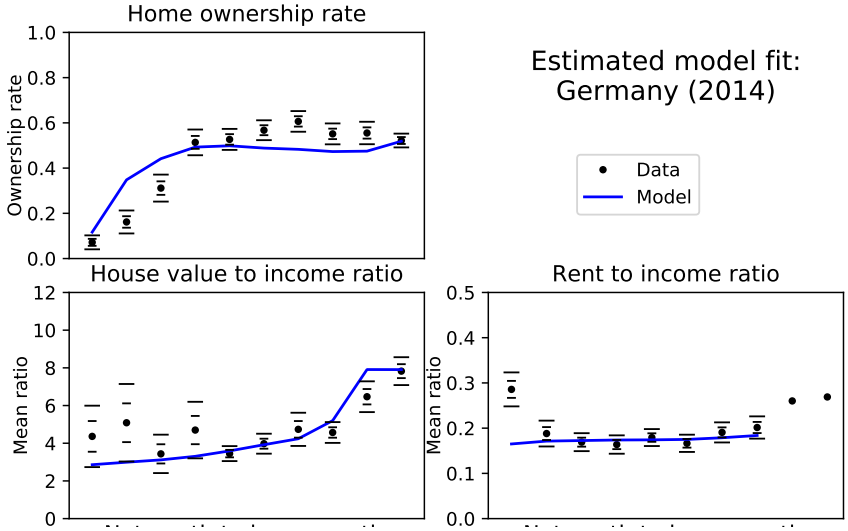
Param	Description	Germany	Spain	France	Italy	U.S.A.
$\grave{G}$	Mean of house price growth factor beliefs (calibrated)	1.010 (—)	1.023 (—)	1.032 (—)	1.000 (—)	1.026 (—)
$\widetilde{G}$	Spread of house price growth factor beliefs	2.92e-2 (0.19e-2)	3.69e-2 (0.03e-2)	3.13e-2 (0.07e-2)	2.65e-2 (0.03e-2)	1.71e-2 (0.04e-2)
λ	Owned housing maintenance cost	3.03e-2 (0.21e-2)	2.07e-2 (0.09e-2)	5.91e-2 (0.07e-2)	7.04e-3 (0.64e-3)	6.79e-2 (0.18e-2)
α	Rental wedge	2.05e-2 (0.19e-2)	4.09e-2 (0.09e-2)	2.56e-2 (0.07e-2)	4.04e-2 (0.07e-2)	1.76e-2 (0.18e-2)
$\grave{\vartheta}$	Mean of log intertemporal discount rate	9.17e-2 (0.02e-2)	4.84e-2 (0.02e-2)	7.49e-2 (0.01e-2)	5.57e-2 (0.04e-2)	3.50e-2 (0.08e-2)
$\widetilde{\vartheta}$	Spread of log intertemporal discount rate	0.298 (0.005)	0.231 (0.001)	0.145 (0.000)	9.50e-2 (0.09e-2)	8.08e-2 (7.87e-2)
ω	Share of housing in utility function	0.177 (0.003)	0.207 (0.007)	0.271 (0.002)	0.198 (0.003)	0.233 (0.002)
L	Bequest motive magnitude	20.26 (0.81)	21.21 (0.32)	10.51 (0.18)	17.87 (0.44)	4.488 (0.641)
κ	Interaction factor between discount rate and house price growth beliefs	-1.80e-2 (0.04e-2)	-1.11e-2 (0.00e-2)	-1.63e-2 (0.01e-2)	-1.37e-2 (0.07e-2)	-1.53e-2 (0.02e-2)

Model fit: Home-ownership Germany, Spain

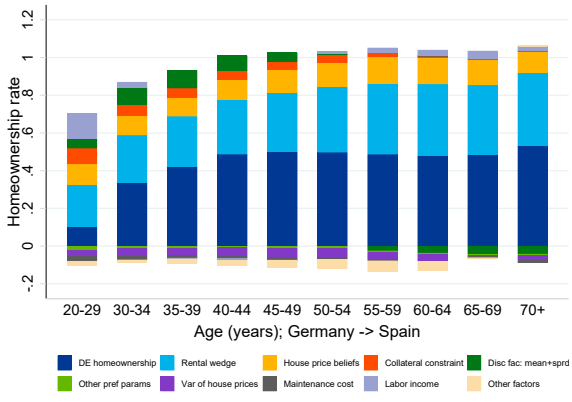




Model fit: Germany; housing, rents



Extensive margin: Home-ownership decomposition, Germany → Spain (ES)



- **Home-ownership, Ger**
- **Rental wedge:** Spain has worse rental market → higher HO ∼**+60%**
- **HP beliefs:** ES more optimistic → higher HO ∼**+25%**
- Households compare:

$$\underbrace{r+\lambda-\dot{G}}_{\text{user cost of owning}} \quad \text{to} \quad \widehat{\alpha} \equiv \underbrace{\alpha}_{\text{rental wedge}} + \underbrace{\lambda}_{\text{cost of renting } \widehat{\alpha}}$$

or $r - \dot{G}$ to α

- 1pp Δ in $\dot{G}, \alpha \Rightarrow$ 15pp ΔHO
  Very powerful!

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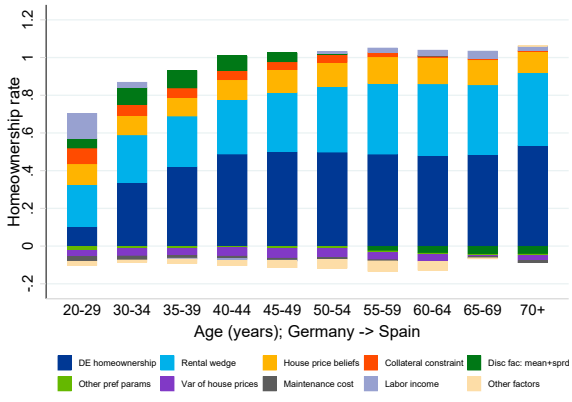

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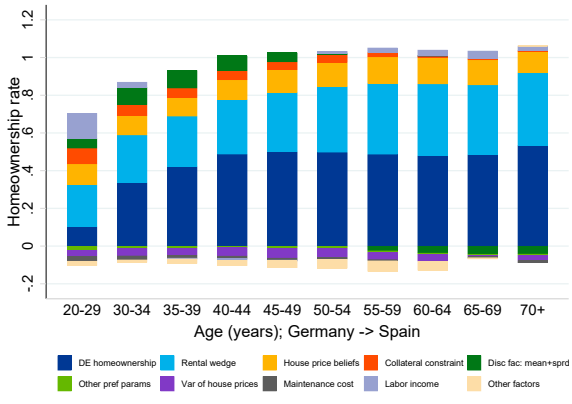

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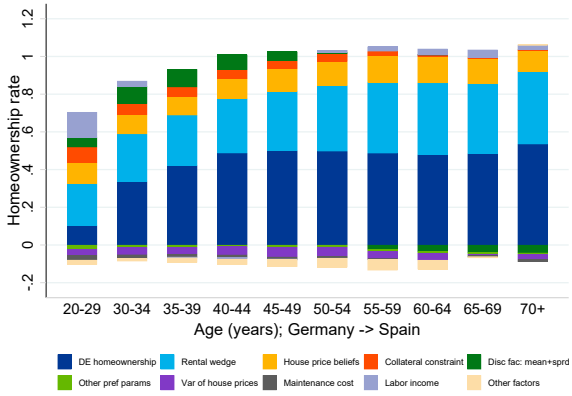

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- **Variance of house prices:** higher var lowers ES HO

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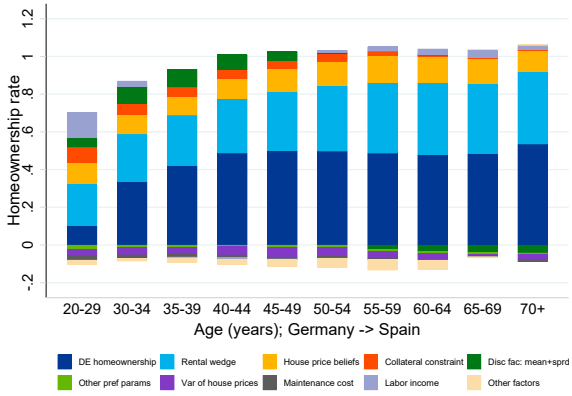

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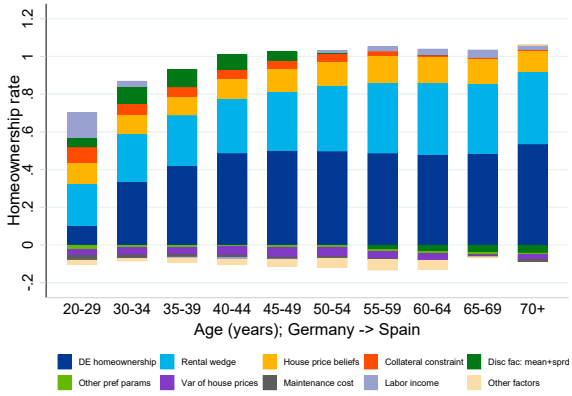

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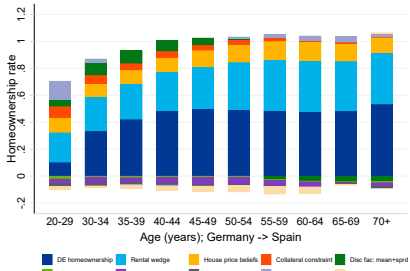
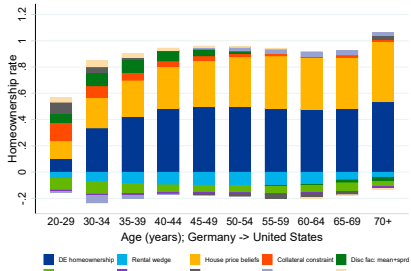
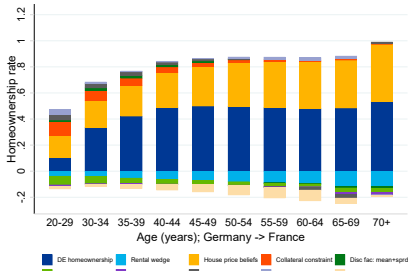
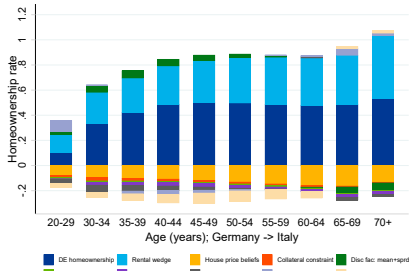
Home-ownership across countries: Rental wedge, HP beliefs matter ∼50–50

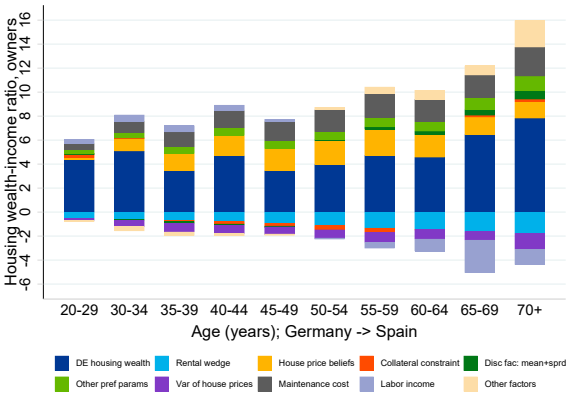








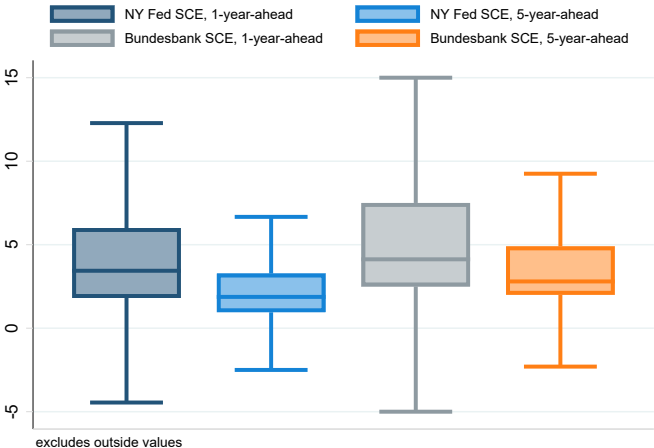
Intensive margin: Mean housing wealth–income ratios, Germany → Spain (ES)



- **Housing wealth, Ger**
- **Maintenance costs:** ES lower maint costs increase housing wealth
- **Rental wedge:** Selection eff: Spain has worse rental mkt → more people own; but marginal owners buy lower housing wealth
- **HP beliefs:** ES more optimistic → owners accumulate more housing

Cross-check—Heterogeneity in survey-based house price expectations: 5-year-ahead less dispersed than 1-year-ahead

In line with model estimates of HP expectations: $[\grave{G} \neq \widetilde{G}]$ $\quad \widetilde{G} \approx 0.02$ to 0.04



Source: Bundesbank Survey on Cons Expectations 2019; NY Fed Survey of Cons Expectations 2014–2019.

Cross-check—Households tend to permanently differ in expectations

Reg's à la Giglio 2021: Indiv fixed effects explain bulk of expl variation (time FEs don't)

Mean house price beliefs: $\widehat{G}_{i,t} = x_i + z_t + \varepsilon_{i,t}$

	R^2 (percent) of panel regression			
Country	Time FE	Individual FE	Time + individual FE	Observations
Germany	1.5	**41.9**	43.0	2,342
France	0.4	**32.9**	33.2	2,397
Italy	0.7	**37.2**	37.8	2,539
Spain	1.7	**37.3**	38.4	2,399
United States	0.7	**42.3**	42.7	953

Note: Source: ECB Consumer Expectations Survey, waves April 2020–September 2023—42 monthly waves; U.S. Survey of Consumer Expectations, Federal Reserve Bank of New York, January 2020–February 2023. The table reports R^2 from the regressions of average house price beliefs on time fixed effects (column 2), on individual fixed effects (column 3) and on both time and individual fixed effects (column 4). Column 4 (rightmost) reports the average number of households across waves. The structure of the table follows Giglio et al. (2021), Table 6. The sample is restricted to households for whom at least 8 observations are available.

Conclusions

- We estimate 'canonical' model of housing across five countries
- **What drives cross-country differences in housing?**
  - **Homeownership (ext margin):** HP beliefs $\grave{G}$ 45%; institut'ns (rental wedge) 45%
    Households compare: $\underbrace{r + \lambda - \grave{G}}_{\text{user cost of owning}}$ to cost of renting $\widehat{\alpha} \equiv \underbrace{\alpha}_{\text{rental wedge}} + \lambda$
  - **Housing wealth (intensive margin):** Maintenance costs account for the bulk; a few factors via composition effect (rental wedge, HP beliefs, housing share)
  - Other factors (demographics, income processes, preferences) matter only little

Next steps—Our setup can be applied to analyze other questions, eg:

- How do cross-country diffs in housing affect transmission of shocks?
- Embed our partial equilibrium model in general equilibrium setup
- How do differences in house price beliefs or institutions matter?
  - For wealth accumulation, response of consumption to shocks (scarring), ...

Backup slides

'Canonical' model of housing, non-normalized problem

Normalized problem

Budget constraints and value functions depend on (discrete) housing status d: R, S, M

$$V_j(M_t, \overline{H}_t, P_t, \pi_t) = \max_{\{C_t, H_t, d_t\}} \left\{ U(C_t, H_t) + \underbrace{(1 - \mathrm{D}_j)}_{\text{Mortality}} \beta \mathbf{E}_t \left[V_{j+1}(M_{t+1}, \overline{H}_{t+1}, P_{t+1}, \pi_{t+1}) \right] + \mathrm{D}_j B(\widehat{W}_t) \right\}$$

4 state vars: M, $\overline{H}$, house price π, perm inc P

s.t.

$$A_t = \begin{cases} M_t + (1-\phi)\pi_t \overline{H}_t - C_t - \widehat{\alpha}\pi_t H_t & \text{if } d_t = 0 \quad \textbf{Renter (R)} \\ M_t - C_t - \lambda \pi_t H_t, \quad H_t = \overline{H}_t & \text{if } d_t = 1 \quad \textbf{Stayer (S)} \\ M_t + (1-\phi)\pi_t \overline{H}_t - C_t - (1+\lambda)\pi_t H_t & \text{if } d_t = 2 \quad \textbf{Mover (M)} \end{cases}$$

M: liquid mkt resources, $\overline{H}$: house owned ($= 0$ for renter), H: new house to live in (buy or rent)

$\widehat{\alpha}$: rental cost, λ: maintenance costs, ϕ: selling cost, δ: downpayment, η: house price shocks

$$M_{t+1} = RA_t + Y_{t+1} \quad \text{Housing: } \overline{H}_{t+1} = \widehat{H}_t \quad \text{for} \quad \widehat{H}_t = \mathbf{1}(d_t > 0) H_t$$

Collateral constraint: $0 \leq A_t + (1-\delta)\pi_t \widehat{H}_t$; House price: $\pi_{t+1} = G\eta_{t+1}\pi_t$

Intensive margin—mean housing wealth–income ratios: Maintenance costs