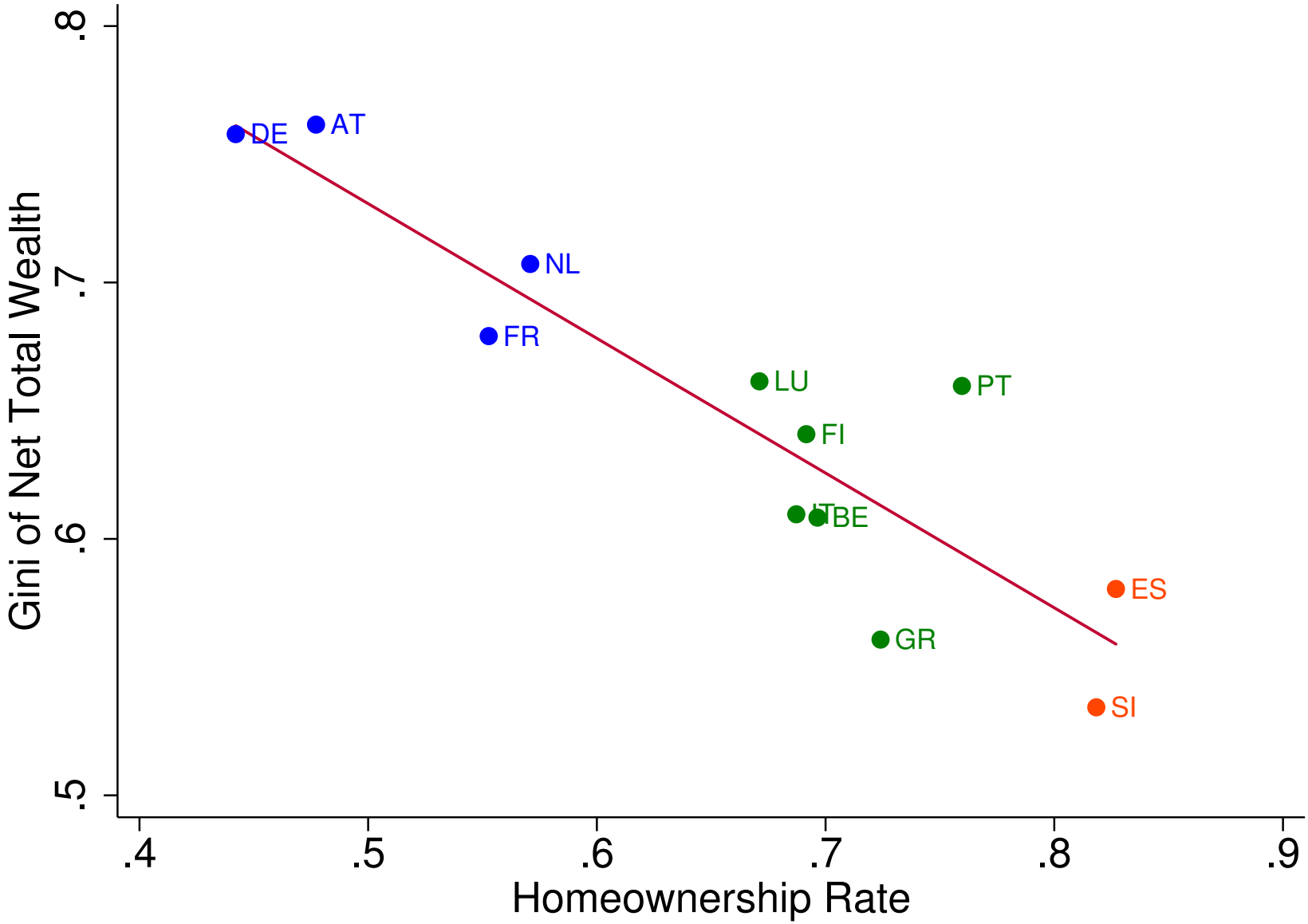
Rental Markets and Wealth Inequality in the Euro Area

Fabian Kindermann and Sebastian Kohls

Homeownership and Wealth Inequality



$$\beta = -0.5253^{***} \quad / \quad R^2 = 0.81$$

Central Questions

- What does the data tell us about the origins of this relationship?
- Can we rationalize this relationship in a model?
- Is wealth inequality a bad thing in this context?

A Preview: Data

- Many renters $\leftrightarrow$ Higher wealth inequality
- Wealth is more unequally distributed among renters compared to the group of homeowners
- Reason: Many renters hold only small amount of wealth

A Preview: Model

- Life cycle model with heterogeneous agents
- Households consume and save under income risk
- Can buy houses to either
  - live in them (consumption value)
  - rent them out to others (investment value)
- Wedge on the rental market for shelter
- Explain 50% of cross-country variation in wealth inequality
- ”Inefficient” rental markets lead to lower wealth inequality

A Preview: Mechanism

- When rental markets are inefficient:
  - Households buy houses earlier in life
  - Save up quickly for down-payment
  - Leads to less individuals with very low wealth
- When rental markets are efficient:
  - Renting and owning are close substitutes
  - Households have time to wait
  - Can finance the house that best suits their needs

The Data

Household Finance and Consumption Survey

- About household wealth and consumption (like SCF)
- Coordinated by ECB, carried out by national banks
- 15 Euro Area countries (dropped: Cyprus/Malta/Slovakia)
- Available since spring 2013
- First wave data mostly collected in 2010/11

Insight 1:

Many Renters

High Wealth Inequality

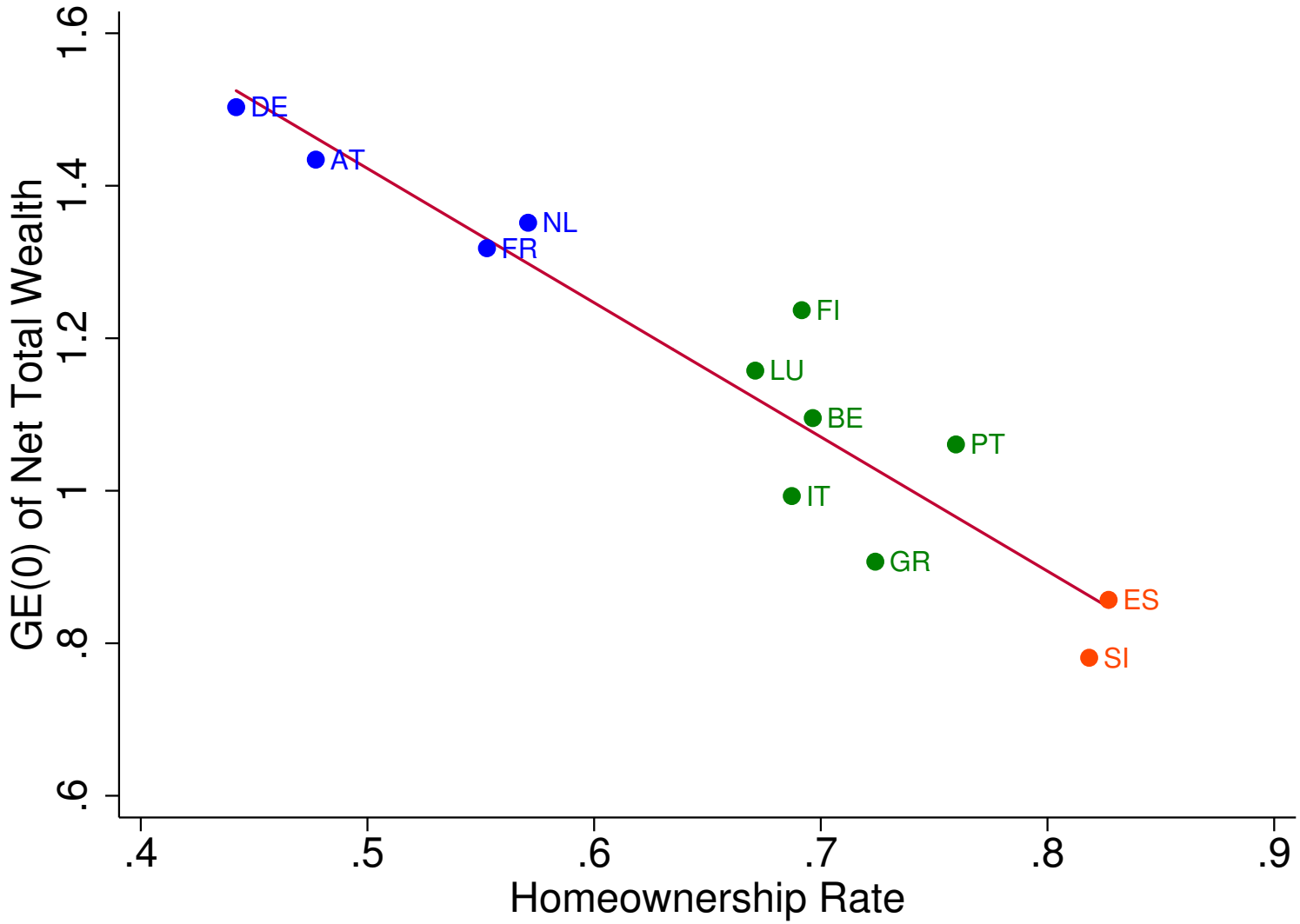
Measure of Inequality

- Drop top 1% wealth holders from sample
- Generalized Entropy Index

$$GE(0) = -\frac{1}{N} \cdot \sum_{i=1}^{N} \log\left(\frac{w_i}{\bar{w}}\right)$$

- Log-deviation from mean
- Puts most weight on inequality at bottom
- GE index easily decomposable

Homeownership and Wealth Inequality

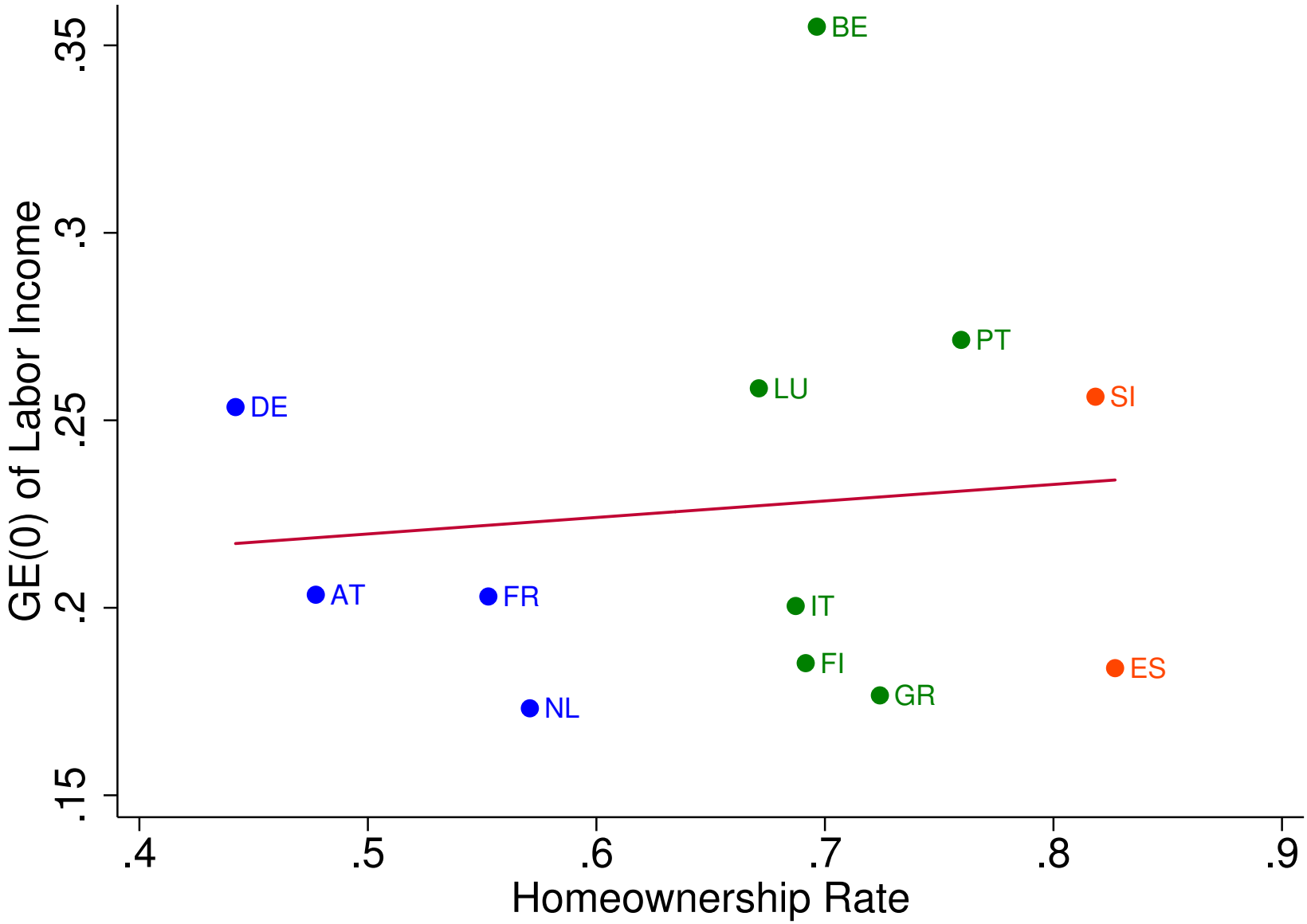


$$\beta = -1.7603^{***} \quad / \quad R^2 = 0.88$$

Gini | p75/p25 | incl. Top 1% | B95% | Positive | Working age

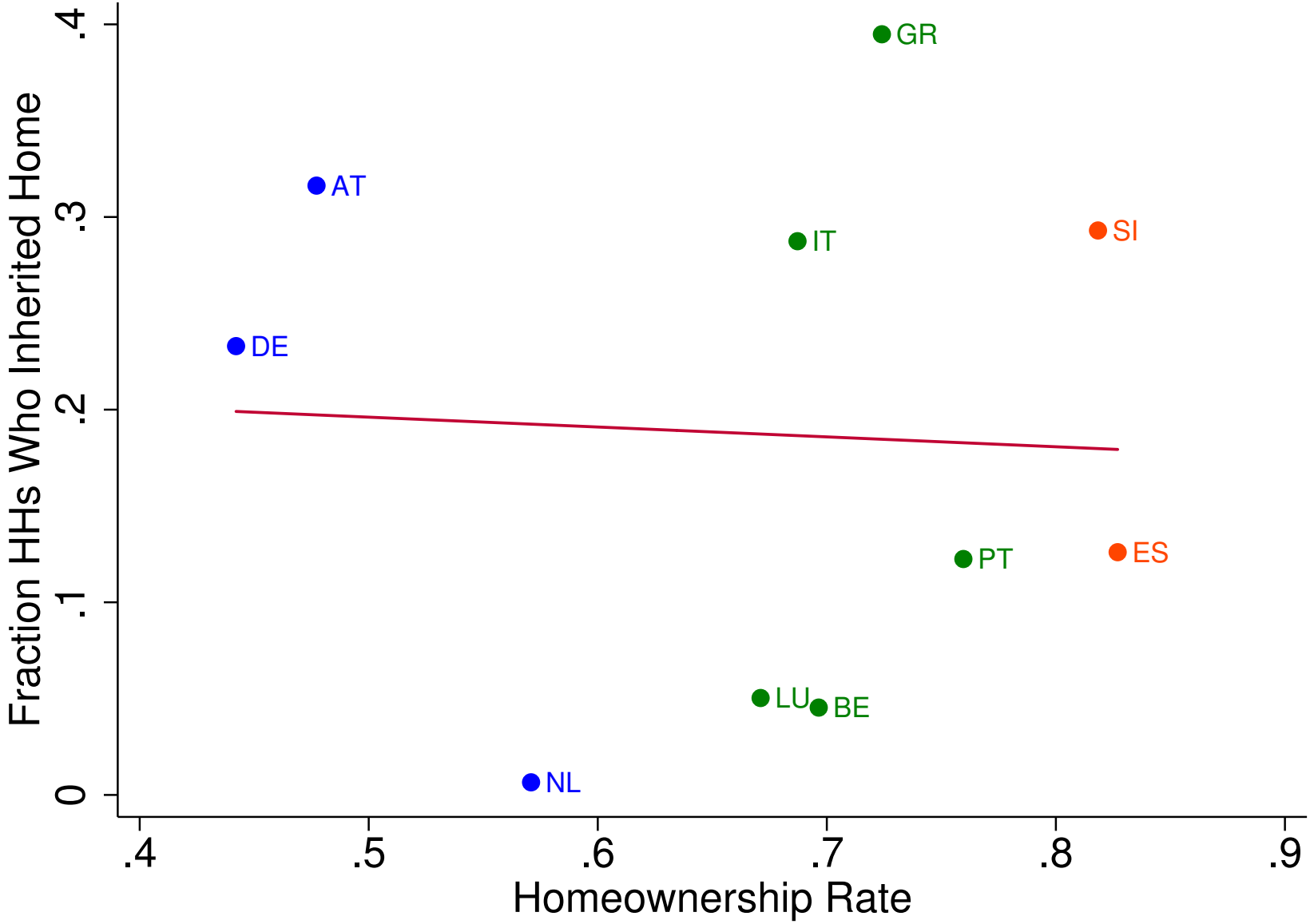
What it is not!

Homeownership and Income Inequality



OECD Data

Fraction of inherited/gifted houses

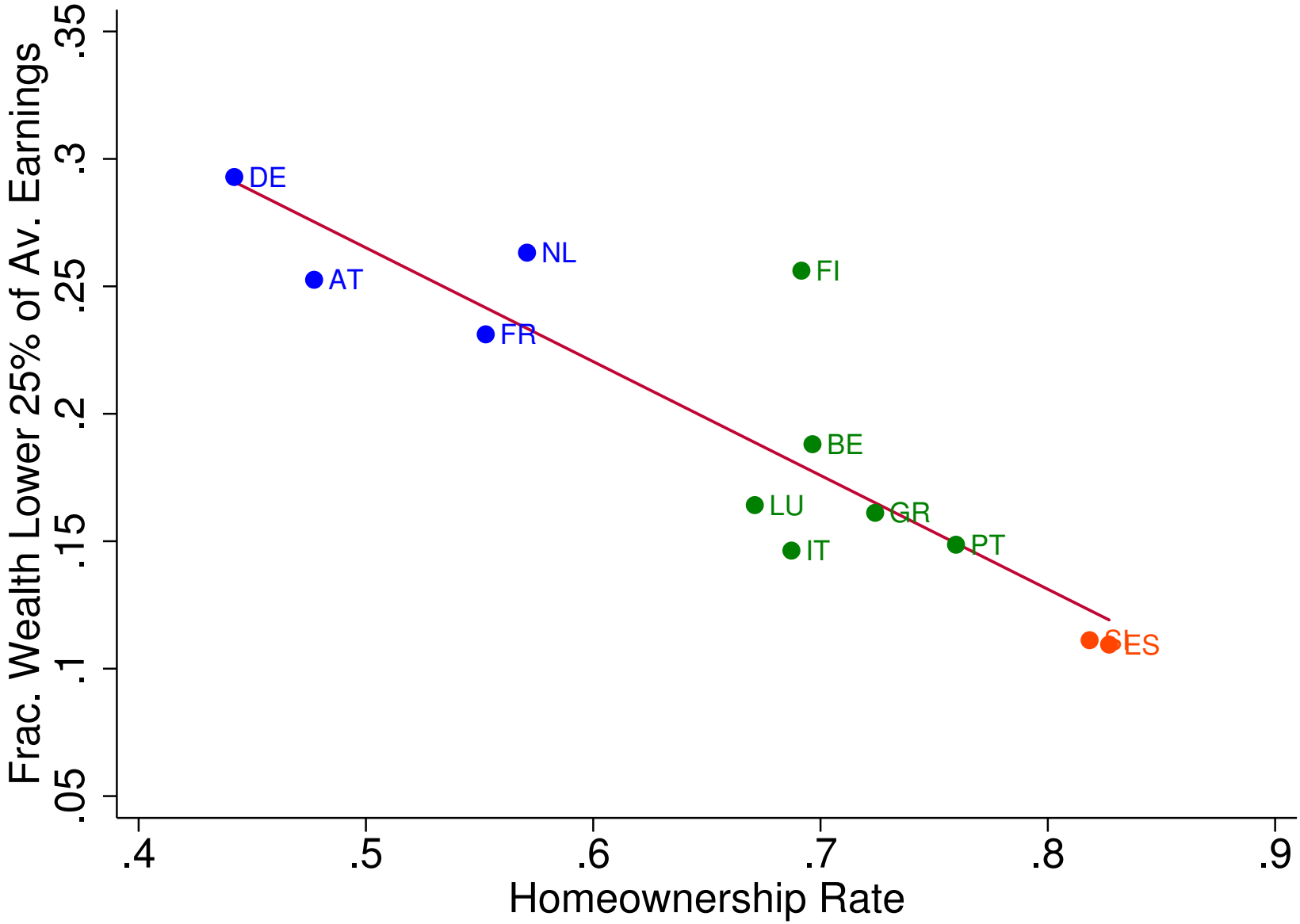


Insight 2:

Many Renters

Many Households with Low Wealth

Homeownership and Low Wealth Households

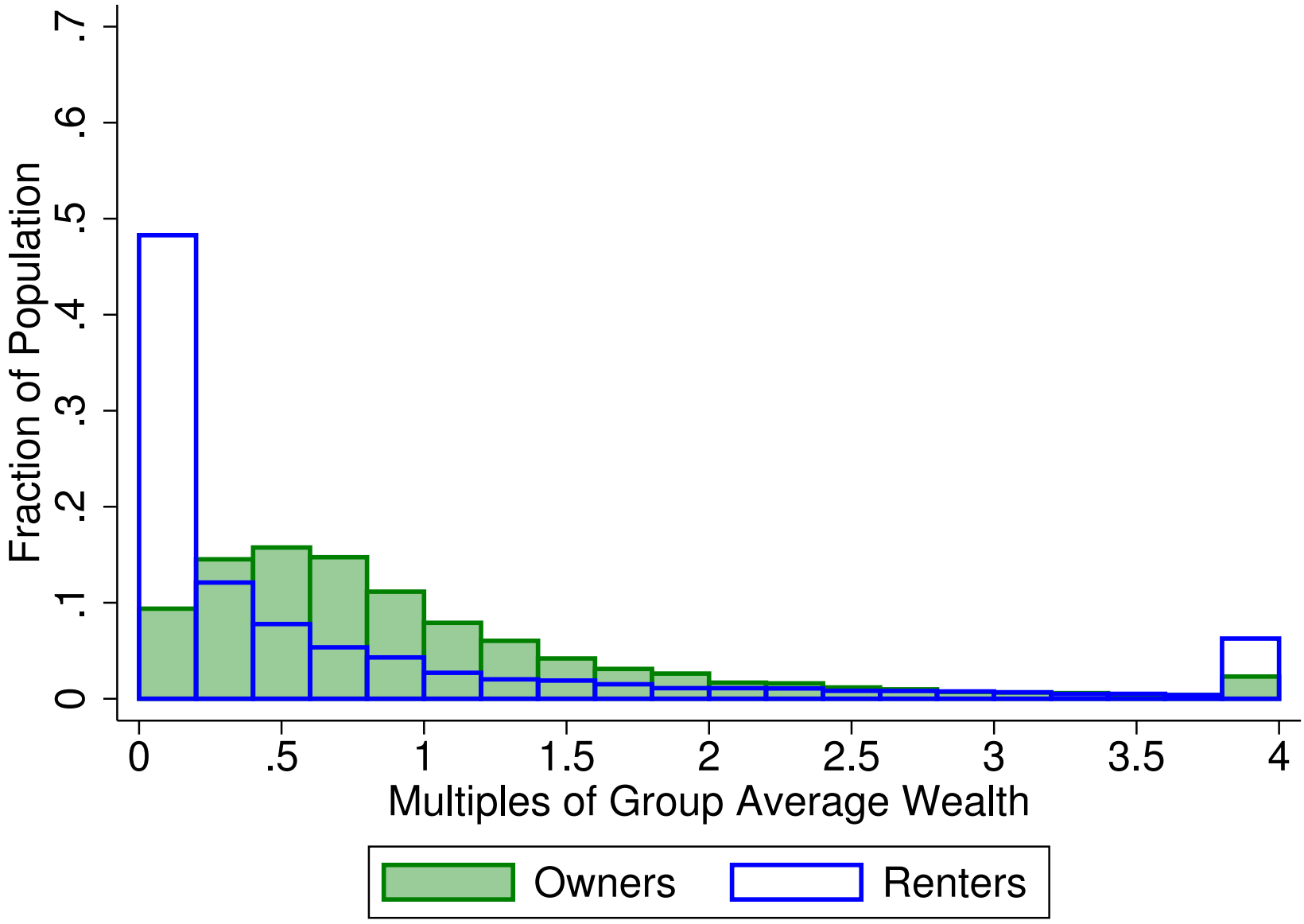


$$\beta = -0.4466^{***} \quad / \quad R^2 = 0.78$$

Insight 3:

Renters are the Ones to Hold Little Wealth

Renters Tend to Hold Little Wealth

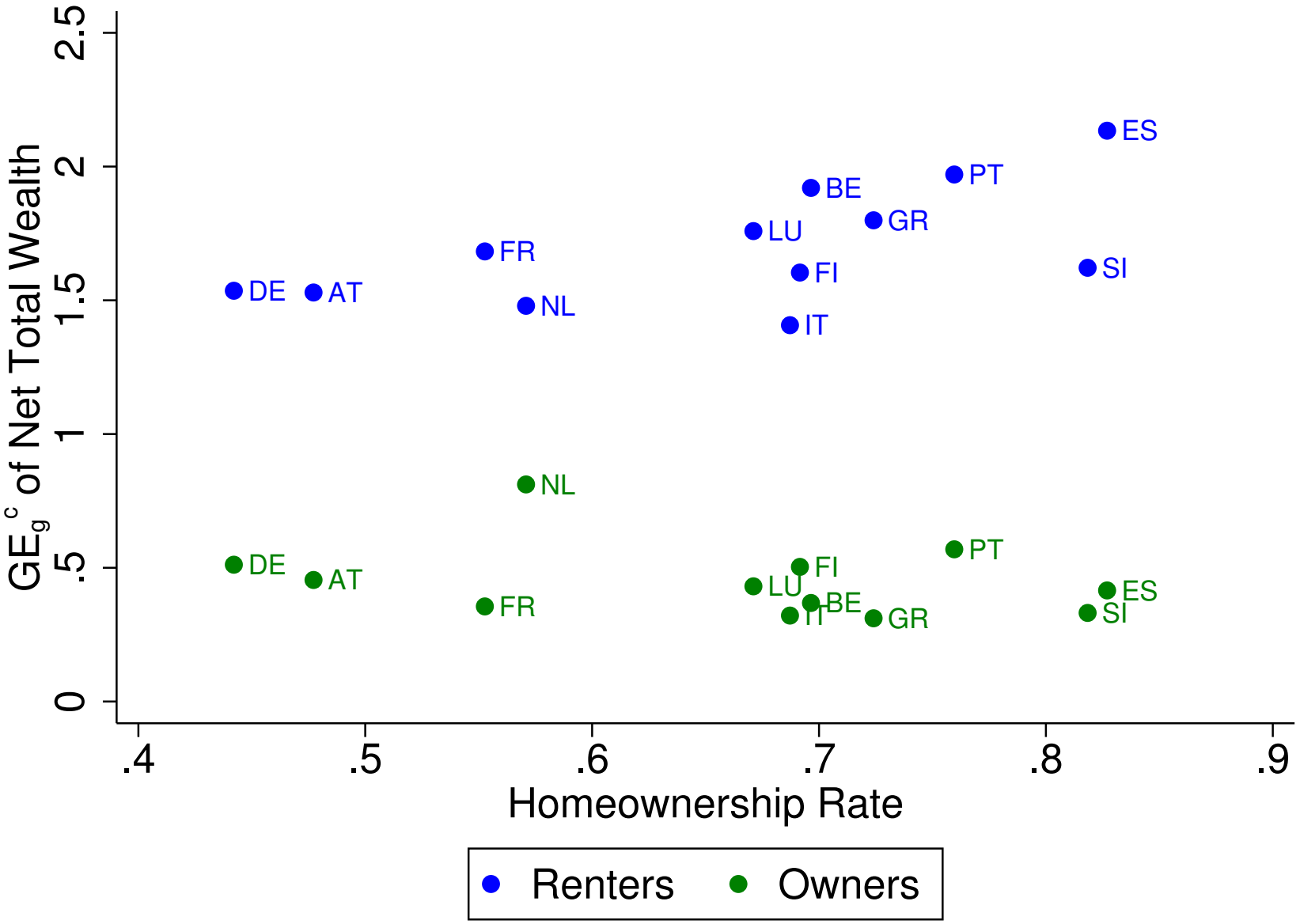


Different Country Types

Insight 4:

Wealth is More Unequally Distributed Among Renters Compared to the Group of Homeowners

Renters are More Unequal

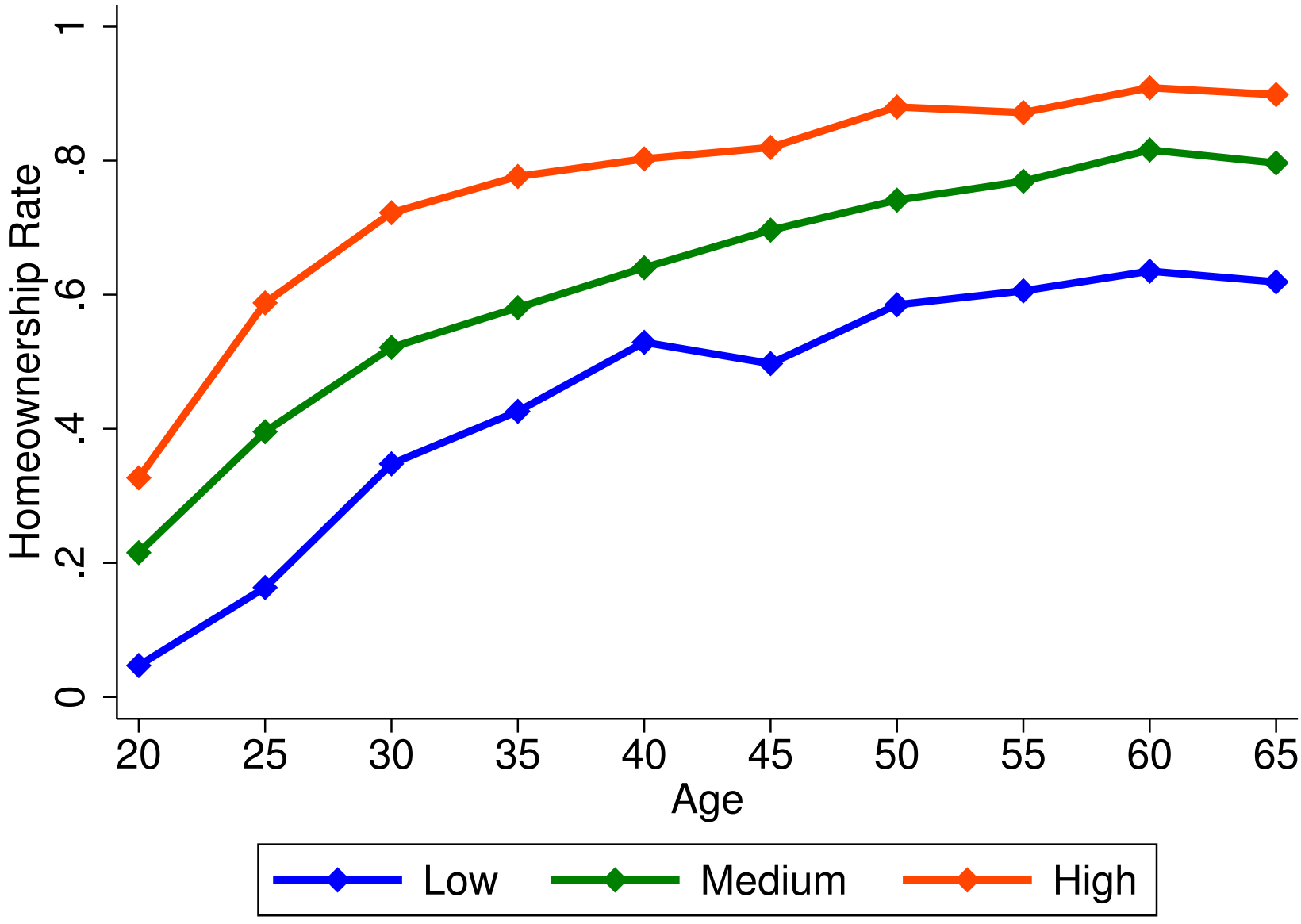


Decomposition

Insight 5:

In Countries with High Homeownership Rate, Young Households Hold more Houses

Homeownership Rate by Age Groups



Summary

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- Many renters $\leftrightarrow$ Higher wealth inequality
- Wealth is more unequally distributed among renters compared to the group of homeowners
- Reason: Many renters hold only small amount of wealth

A Quantitative Model

Baseline Setup

- OLG model in an open economy
- Households consume ”food” and shelter
- Earn stochastic income stream
- Can invest in financial assets and real estate
- Non-convex adjustment costs for real estate
- Part of owned real estate can be rented out
- Wedge τ: renting more expensive compared to owning

Renter $(h = 0)$

- State: $z = (j, \eta, a, 0)$
- Value function

$$V(z) = \max_{c,s,a^+,h^+} \frac{\left[c^{1-\alpha} s^{\alpha}\right]^{1-\sigma}}{1-\sigma} + \beta E\left[V(z^+)|\eta\right]$$

- Budget constraint

$$c + a^+ + p_s s + p_h h^+ + \gamma(h^+, 0) = y^{\text{net}}(j, \eta) + [1 + r(a)]a$$

- LTV requirement and minimum house size

$$a^+ \geq -\lambda_{j+1} p_h h^+ \quad \text{and} \quad h^+ \in \{0, [\underline{h}, \infty]\}$$

Owner $(h \geq \underline{h})$

- State: $z = (j, \eta, a, h)$
- Value function

$$V(z) = \max_{c,s,a^+,h^+} \frac{\left[c^{1-\alpha} s^{\alpha}\right]^{1-\sigma}}{1-\sigma} + \beta E\left[V(z^+)|\eta\right]$$

- Budget constraint

$$c + a^+ + p_h(h^+ - h) + \gamma(h^+, h) + p_h \delta_h h$$
$$= y^{\text{net}}(j, \eta) + p_s(1-\tau)(h-s) + [1 + r(a)]a$$

- LTV requirement/minimum house size/no renting

$$a^+ \geq -\lambda_{j+1} p_h h^+ \quad , \quad h^+ \in \{0, [\underline{h}, \infty]\} \quad \text{and} \quad s \leq h$$

Production Sector/Housing Market/Open Economy

- Production of ”food” Cobb-Douglas in capital and labor
- Housing stock fixed $\overline{H}$
- Small open economy $\rightarrow$ fixed world interest rate r_w
- Financial intermediation

$$r(a) = \begin{cases} r_w - \frac{\kappa}{2} & \text{if } a \geq 0 \\ r_w + \frac{\kappa}{2} & \text{if } a < 0. \end{cases}$$

Government

- Taxes gross income from labor at $T(y)$
- Pays pensions $p(\bar{y}(\eta_{j_r-1}))$ to retirees
- Government expenditure

$$G = T - P.$$

Market Clearing

- Shelter Market (p_s)

$$\int_{\mathcal{Z}} \mathbb{1}_{h=0} \cdot s \; d\Phi = \int_{\mathcal{Z}} \mathbb{1}_{h \geq \underline{h}} \cdot (1-\tau)(h-s) \; d\Phi$$

- Housing market (p_h)

$$\int_{\mathcal{Z}} h \; d\Phi = \overline{H}$$

- Goods market

$$Y = C + I_K + I_h + G + \Psi_\gamma + \Psi_\kappa$$

Calibration

Calibration: Households

- Maximum age $J = 80$
- Retirement at age $j_r = 63$
- No uncertain survival
- Expenditure share $\alpha = 0.16$ (Eurostat)
- Relative risk aversion $\sigma = 2$

Calibration: Capital Markets and Housing

- Interest rates (ECB)

$$r_w = 0.02 \quad \text{and} \quad \kappa = 0.0191$$

- LTV requirement $\lambda_1 = 0.8$ (Andrews, 2011)
- Increases linearly to 0 from age 40 to retirement
- Adjustment costs

$$\gamma(h^+, h) = \begin{cases} 0 & \text{if } h^+ = h \\ \gamma_0 + \gamma_1 |h^+ - h| & \text{otherwise} \end{cases}$$

- Set $\gamma_0 = 5000€$ and $\gamma_1 = 0.05$ (Andrews et al. (2011))

Calibration: Labor Income, Taxes, Pensions

- Labor income process

$$\log y(j,\eta) = y_j + \eta \quad \text{with} \quad \eta^+ = \rho_e \eta + \varepsilon\,,\ \varepsilon \sim N(0,\sigma_\varepsilon^2).$$

- Use cross-section of HH labor earnings from HFCS (complemented by LIS data for NL and SI)
- Regress on age fixed effects
- Use residuals to determine variance σ_ε^2 with $\rho = 0.95$
- Smooth out age profiles by piecewise polynomials
- Tax and pension functions for each country following Guvenen et al. (2014) using OECD data

Calibration to Germany

- Impose zero trade balance
- Apply German tax and pension system
- Normalize house price to $p_h = 1$
- $\beta = 0.9569 \rightarrow$ share of low-wealth households $\approx$ 0.30

The Thought Experiment

The Thought Experiment

- Simulate the German economy
- Fix housing stock to German level
- Set country specific incomes and policies
- Calibrate τ for each country to match homeownership rate

Simulation Results

Homeownership Rates and Wedges

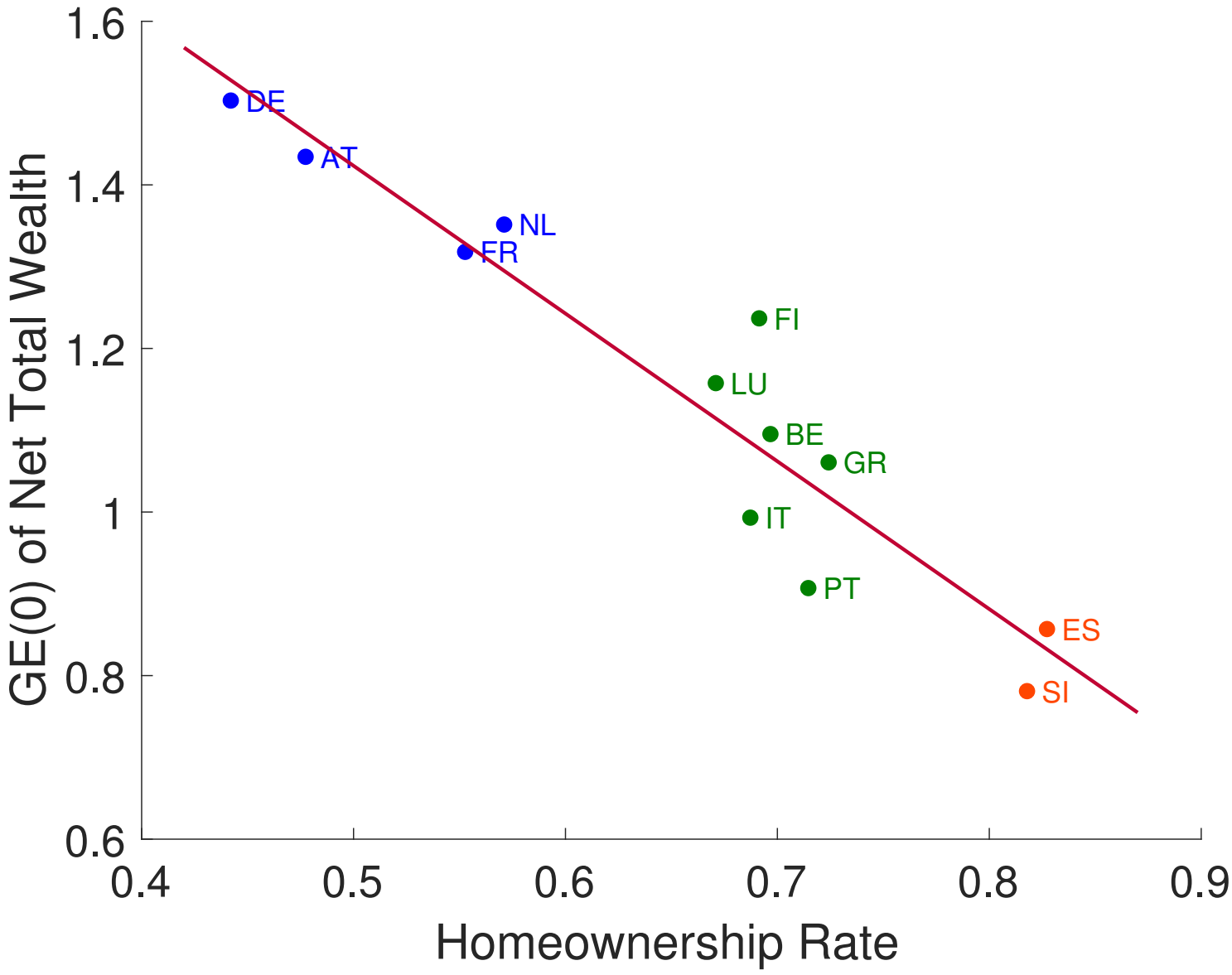
Country	**HO rate Data**	**HO Rate Model**	τ
Germany	44.2%	44.2%	0.1363
Austria	47.7%	47.7%	0.1006
France	55.3%	55.3%	0.1936
Netherlands	57.1%	57.1%	0.2032
Luxembourg	67.1%	67.1%	0.3827
Italy	68.7%	68.7%	0.3374
Finland	69.2%	69.1%	0.4016
Belgium	69.6%	69.7%	0.4685
Portugal	71.5%	71.5%	0.3401
Greece	72.4%	72.4%	0.4214
Slovenia	81.8%	81.8%	0.7894
Spain	82.7%	82.7%	0.7048

Model vs. Data 1:

Many Renters

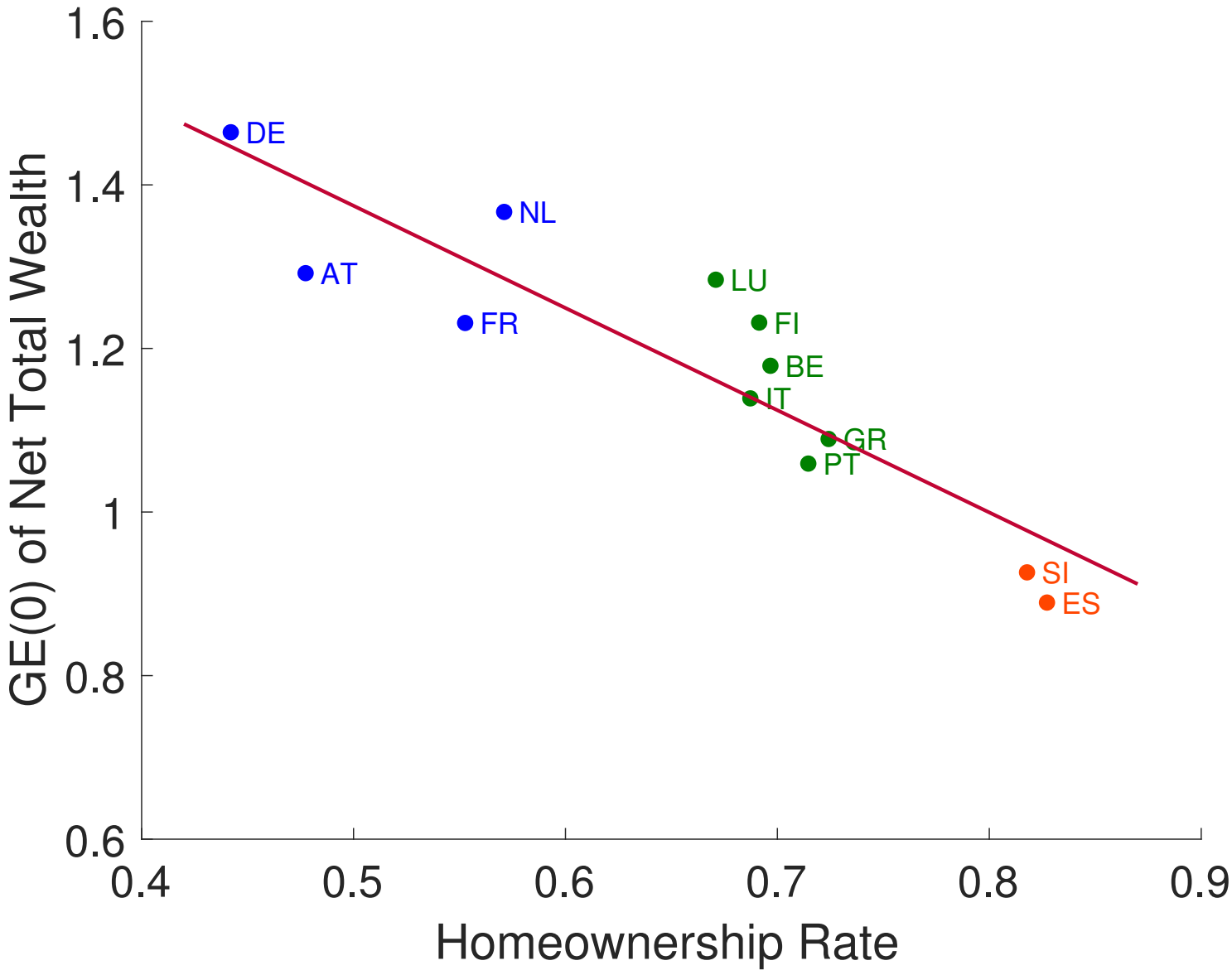
High Wealth Inequality

Homeownership and Wealth Inequality: Data



$$\beta = -1.7603^{***} \;\; / \;\; R^2 = 0.88$$

Homeownership and Wealth Inequality: Model



$$\beta = -1.2499^{***} \;\; / \;\; R^2 = 0.80$$

Explanatory Power of the Model

- Total Sum of Squares

$$TSS = \sum_c \left(GE^c_{\text{data}} - \overline{GE}_{\text{data}} \right)^2$$

- Residual Sum of Squares

$$RSS = \sum_c \left(GE^c_{\text{model}} - GE^c_{\text{data}} \right)^2$$

- R-squared

$$R^2 = 1 - \frac{RSS}{TSS}$$

Explanatory Power of the Model

Model	**SS Data**	**RSS**	R^2
Total	0.5977	0.1199	**79.94%**

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Total	0.5977	0.1199	**79.94%**
- only rental wedge τ	0.5977	0.3018	**49.52%**

Explanatory Power of the Model

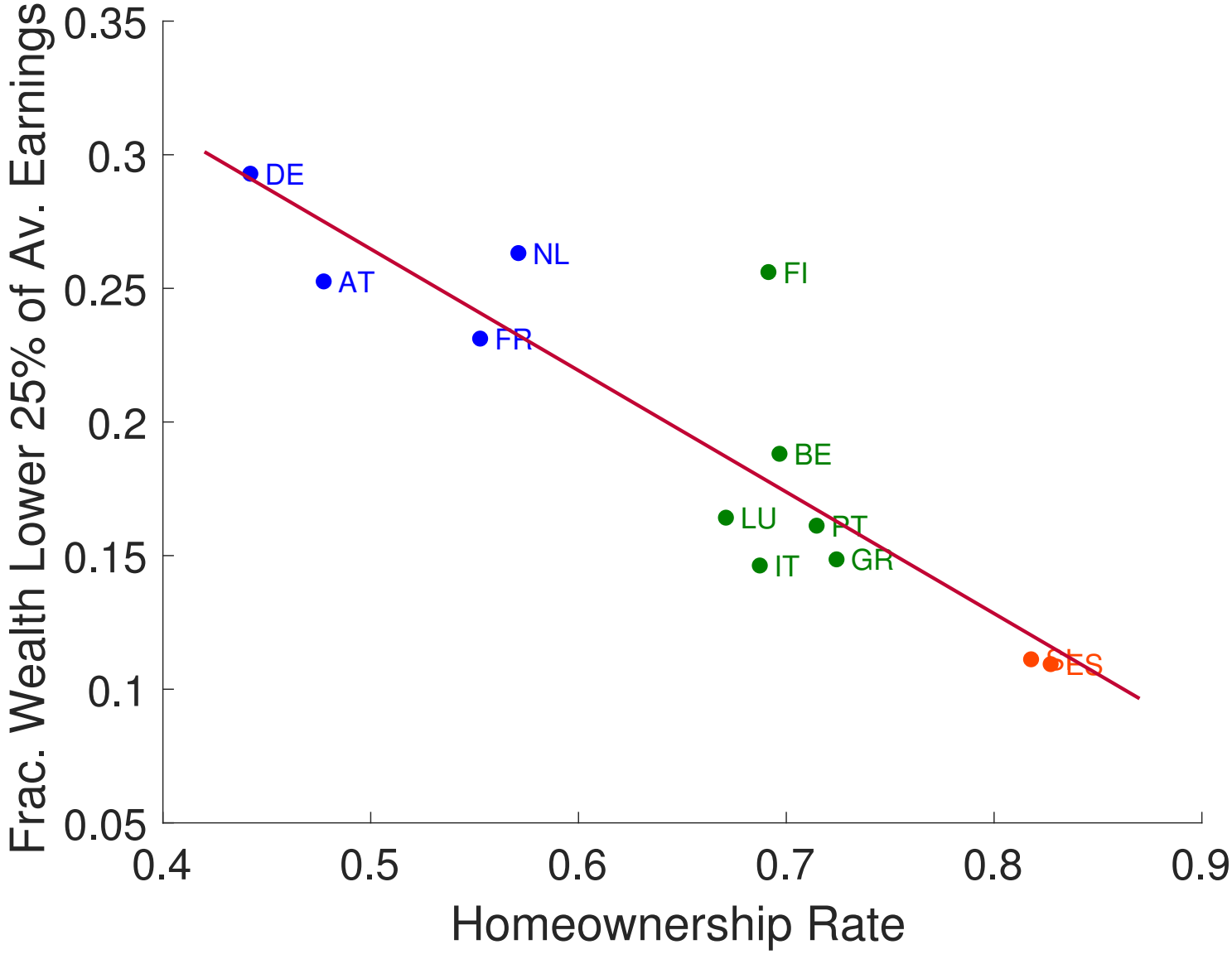
Model	**SS Data**	**RSS**	R^2
Total	0.5977	0.1199	**79.94%**
- only rental wedge τ	0.5977	0.3018	**49.52%**
- only income + policy	0.5977	0.3827	**35.97%**

Model vs. Data 2:

Many Renters

Many Household with Low Wealth

Households with Low Wealth: Data



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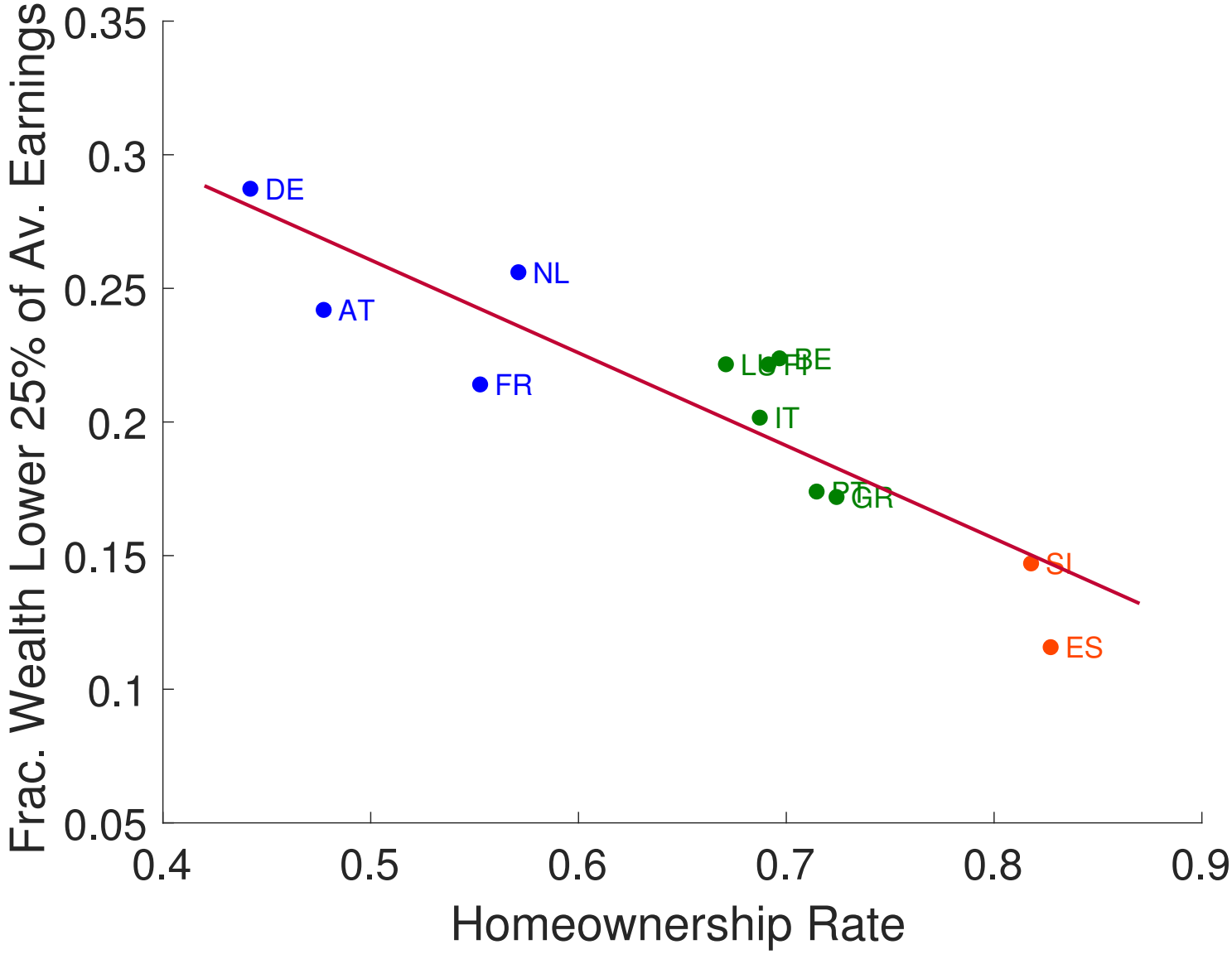
Households with Low Wealth: Model

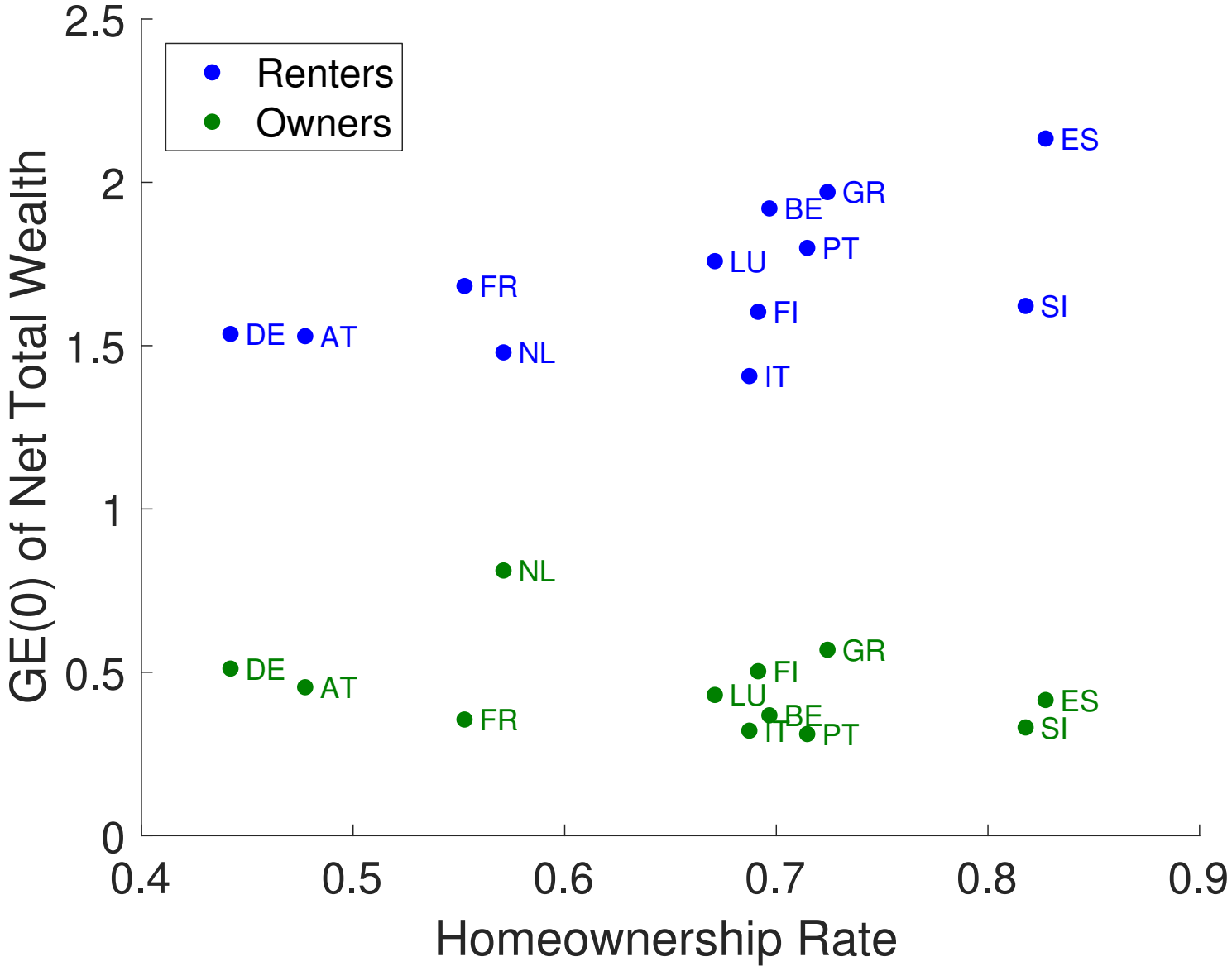


$$\beta = -0.3473^{***} \;\; / \;\; R^2 = 0.79$$

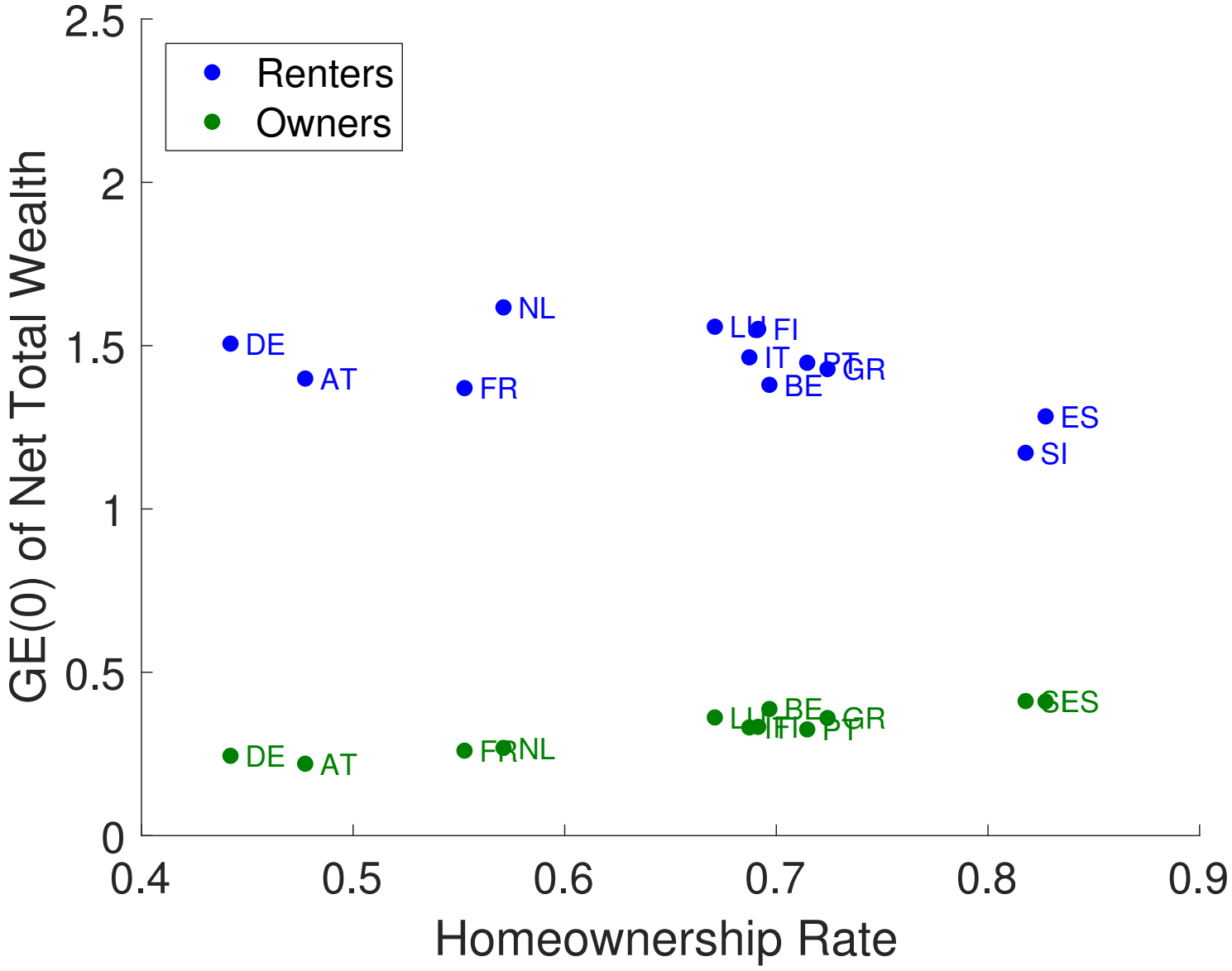
Model vs. Data 3:

Wealth is More Unequally Distributed Among Renters Compared to the Group of Homeowners

Renters are More Unequal: Data



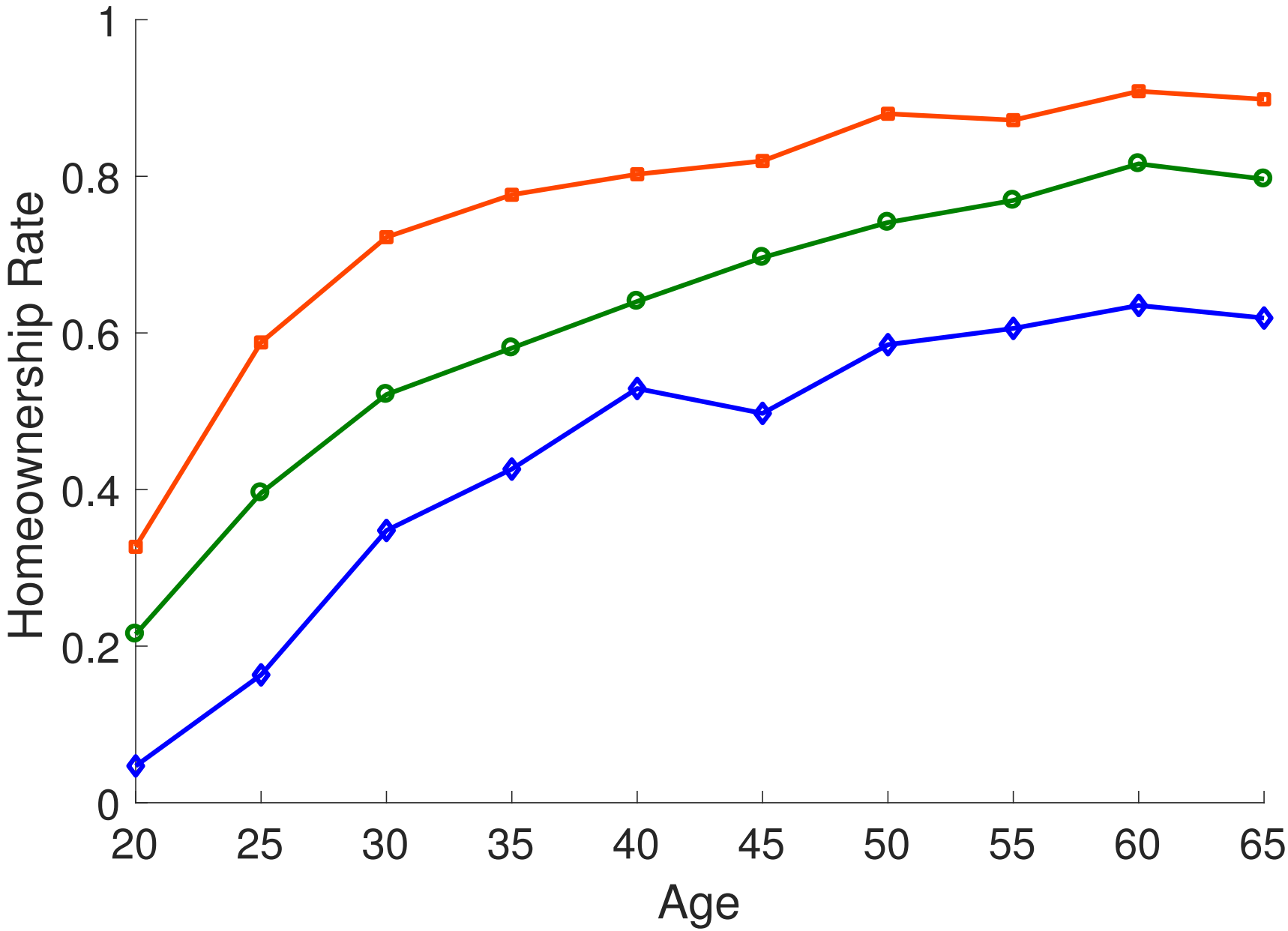
Renters are More Unequal: Model



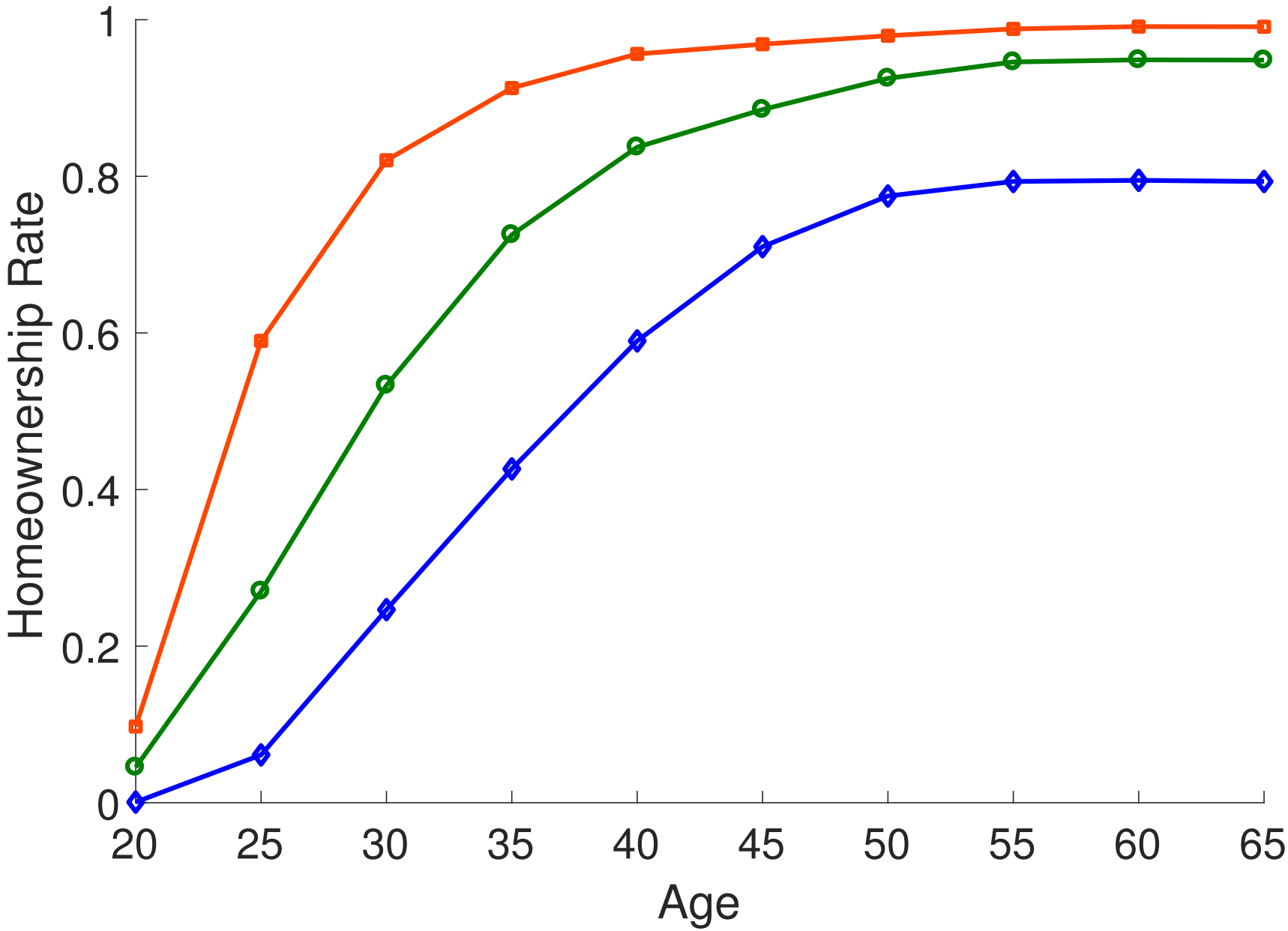
Model vs. Data 4:

In Countries with High Homeownership Rate, Young Households Hold more Houses

Homeownership Rate by Age Groups: Data



Homeownership Rate by Age Groups: Model

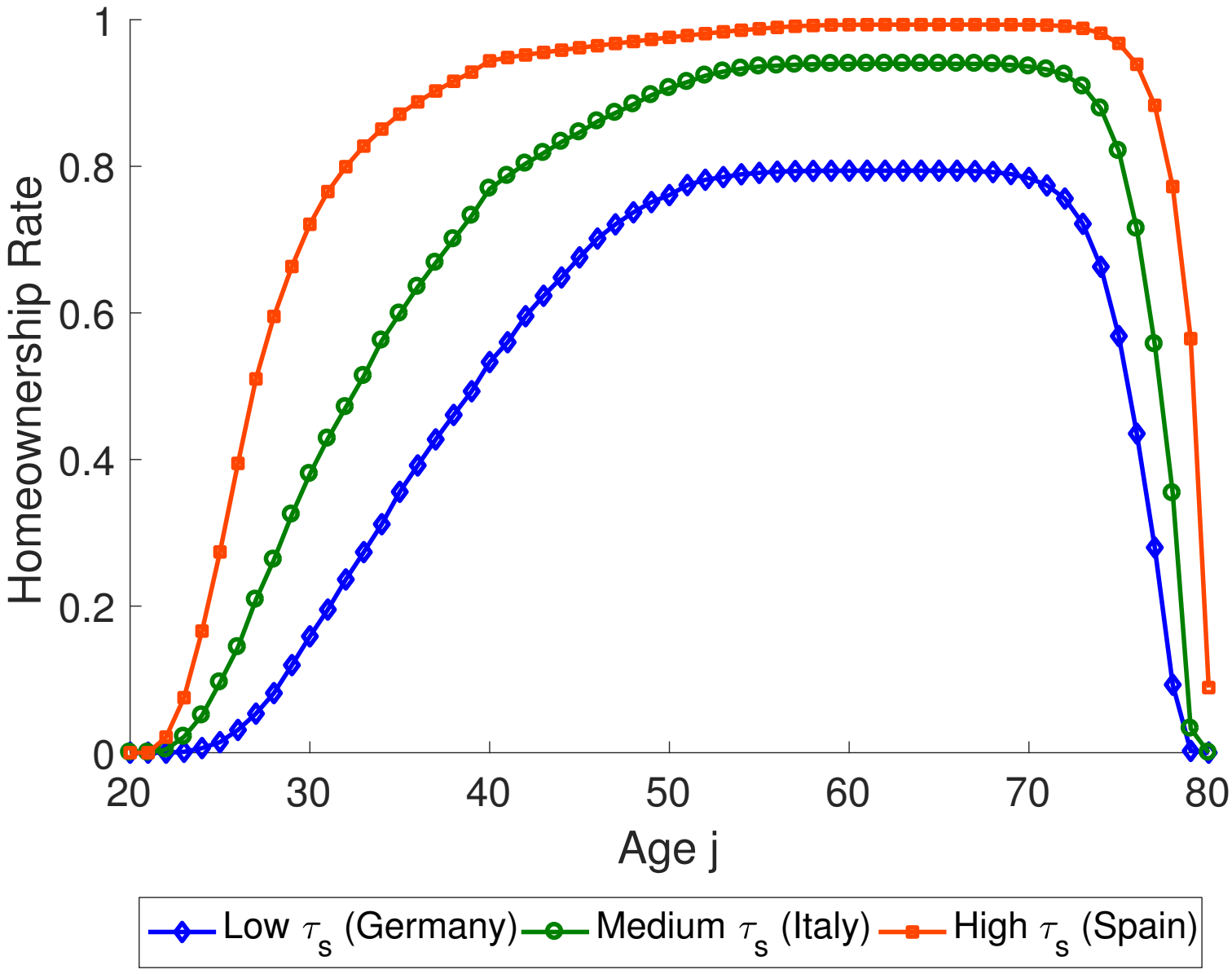


The Underlying Mechanism

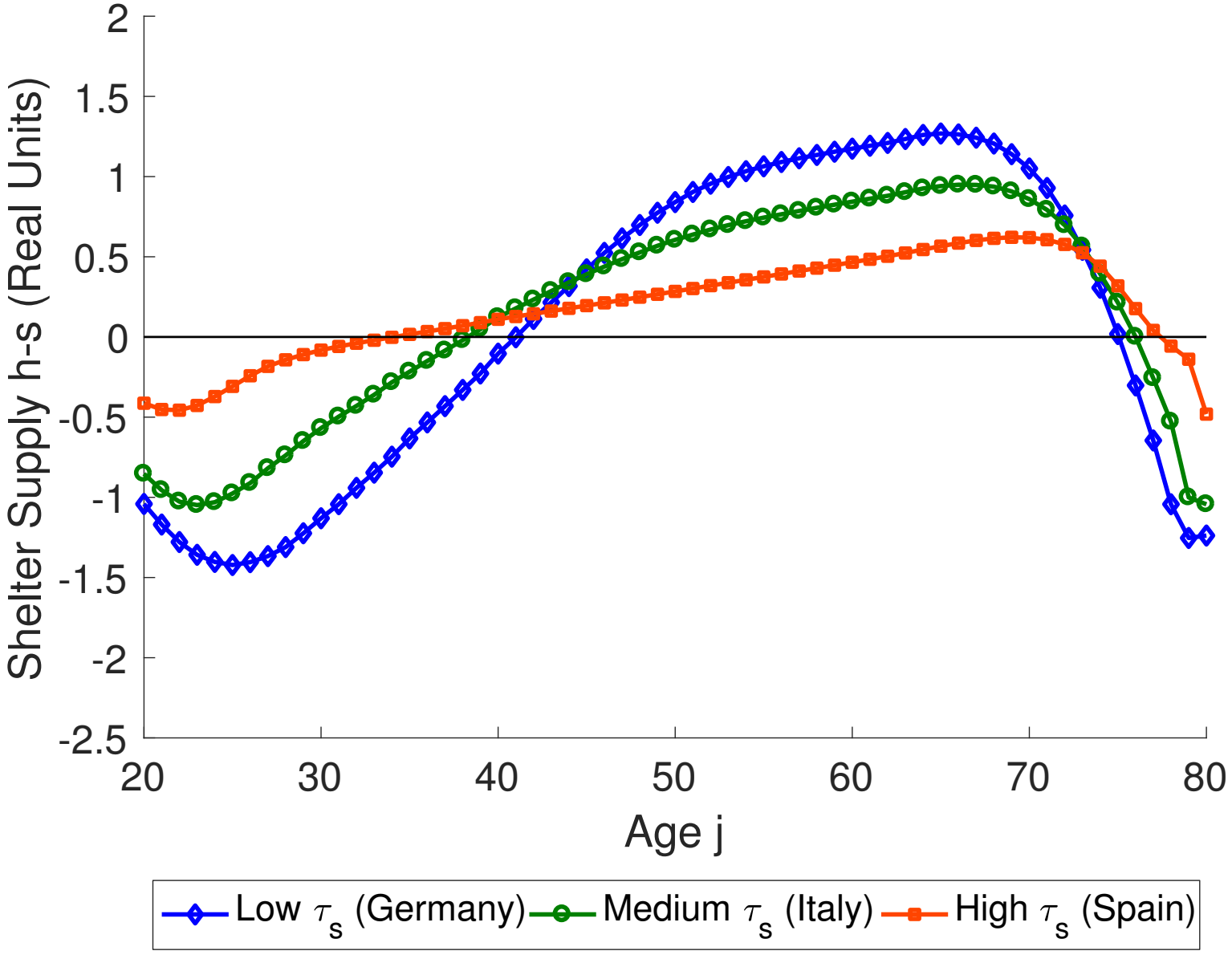
For Illustration Purposes

- Create a hybrid country out of the 12 sample countries
- Average income profiles and variances
- Average tax and pension policy
- Only vary τ across the countries.

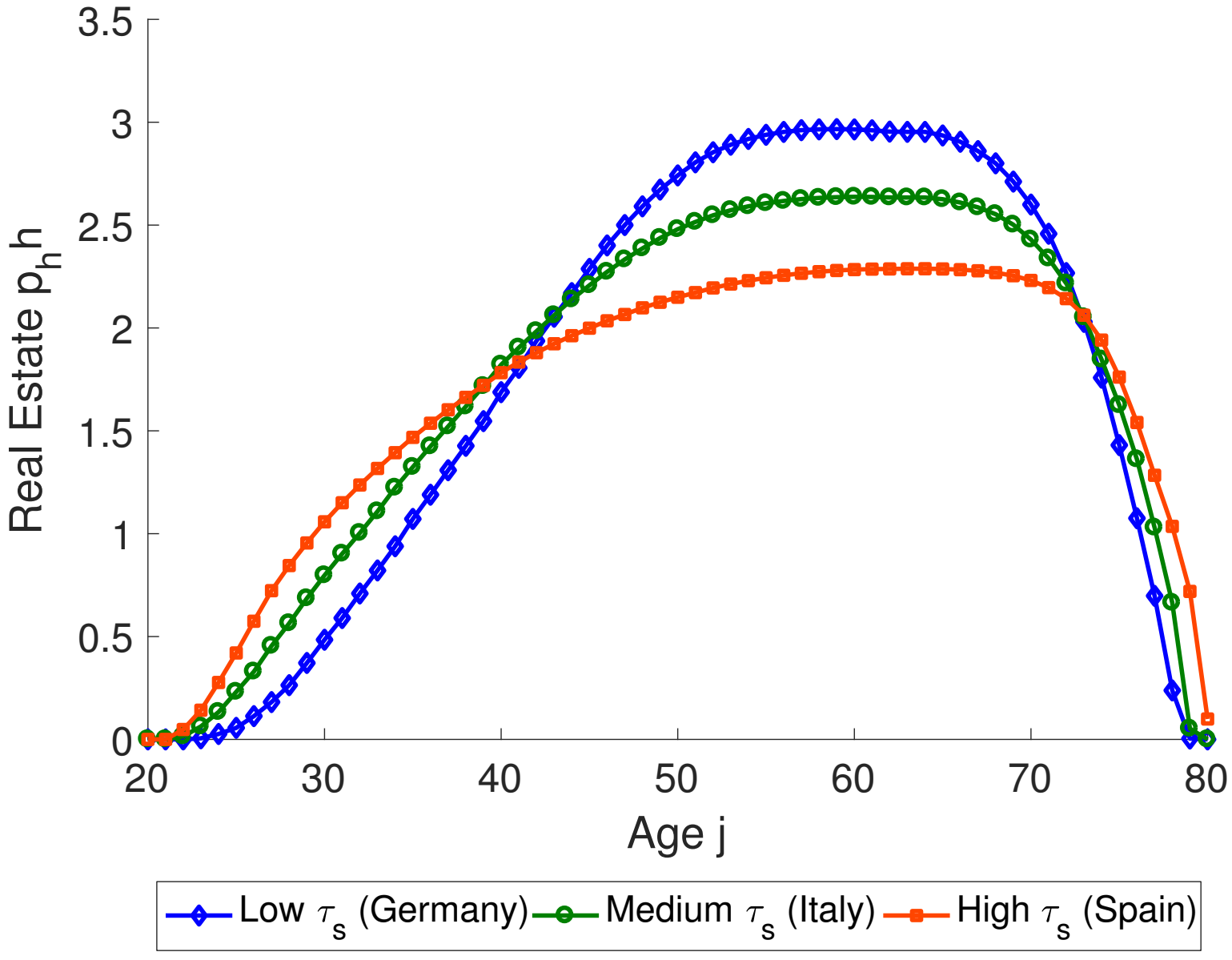
Homeownership Rates by Age in the Model



Shelter Supply

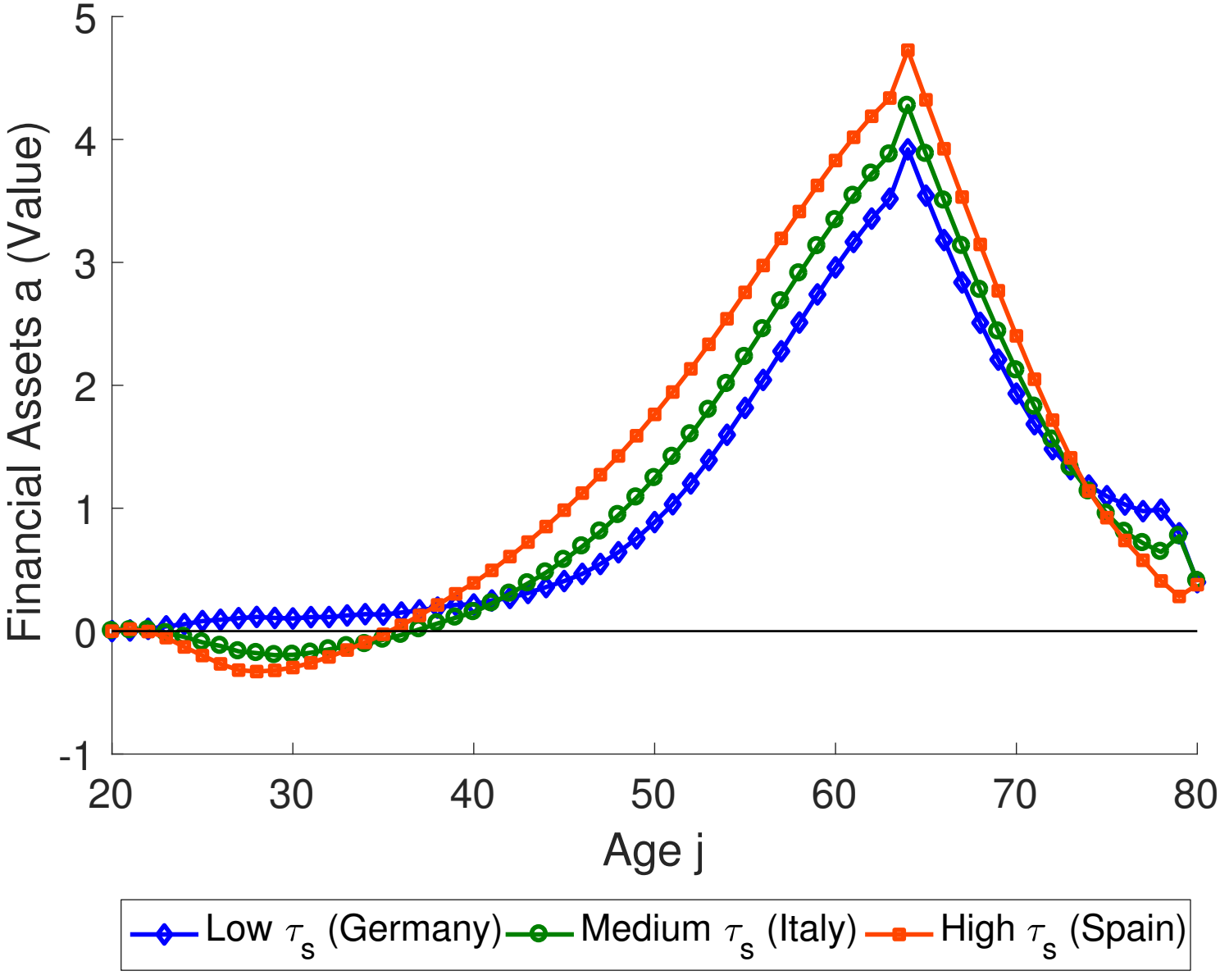


Real Estate Investment



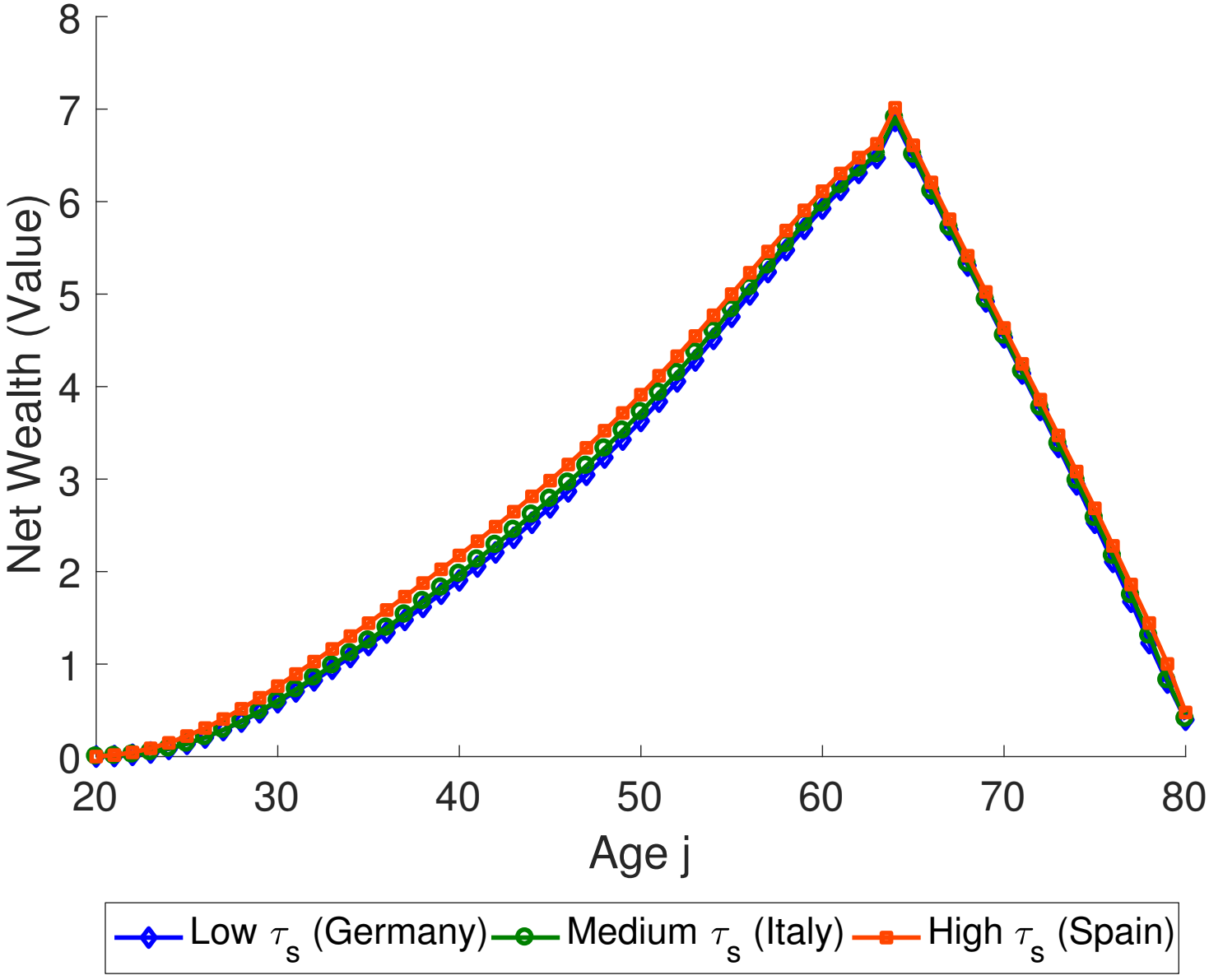
When Young

Financial Assets



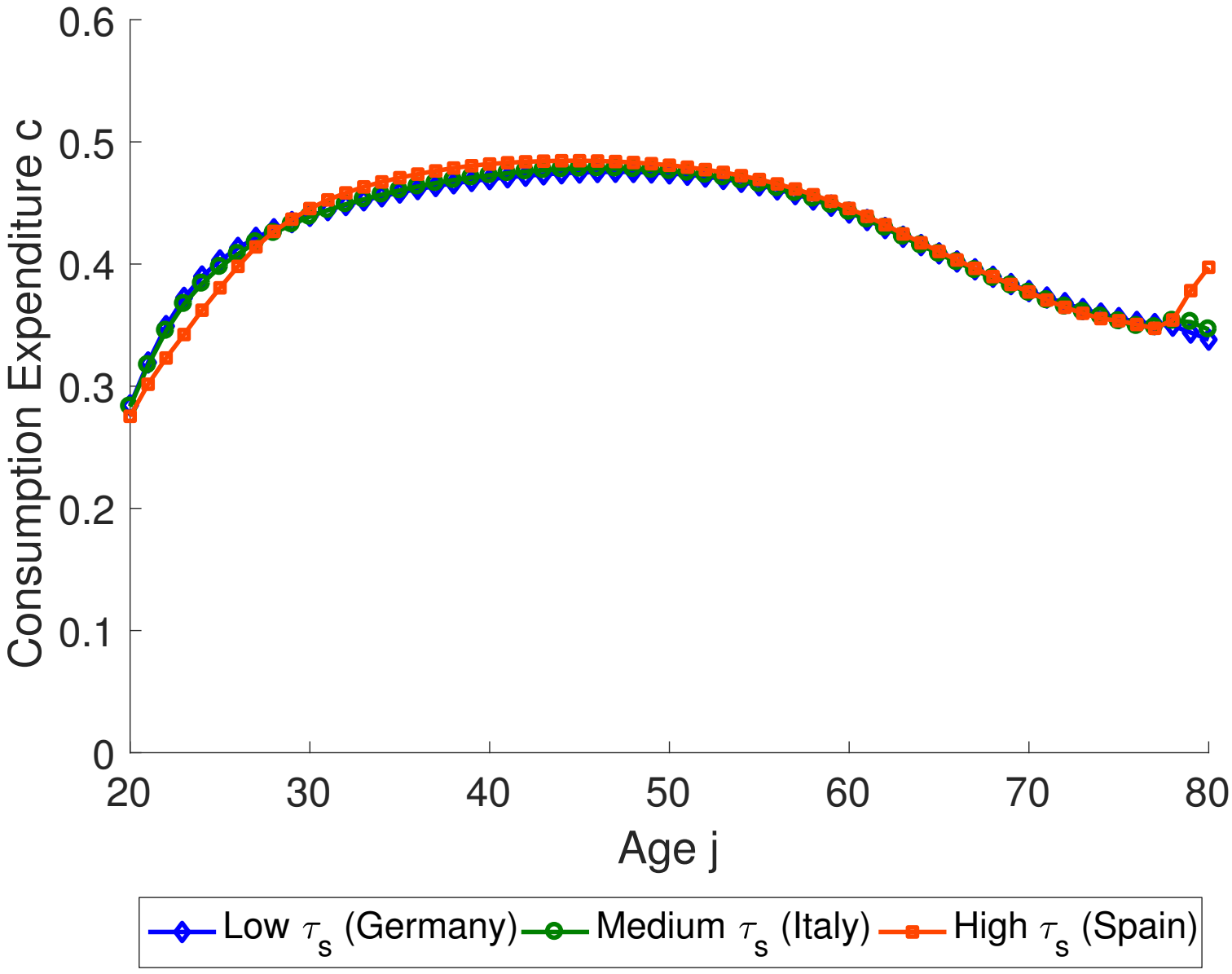
When Young

Net Wealth



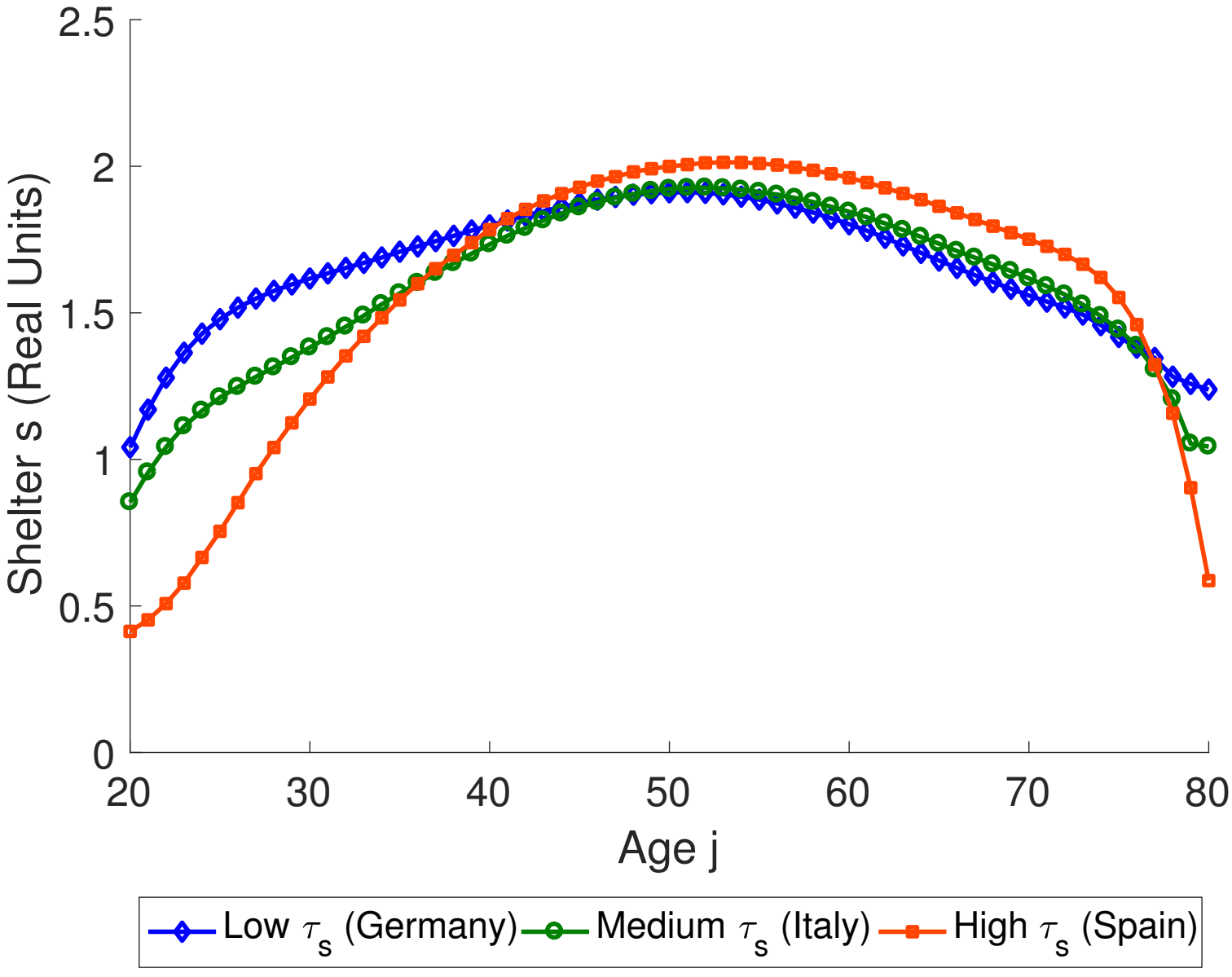
When Young

Consumption



When Young

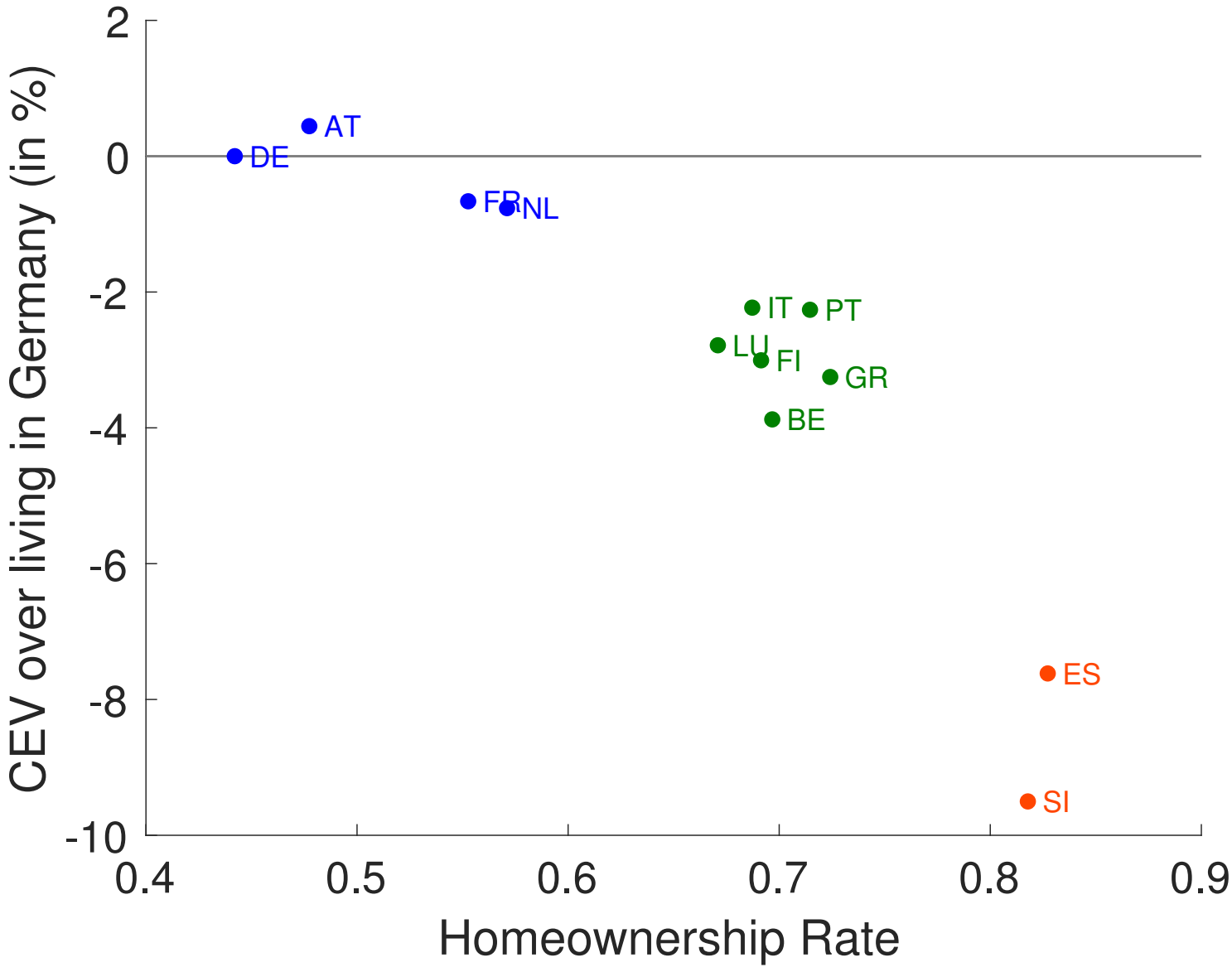
Shelter



When Young

Some Normative Statement

Consumption Equivalent Variation

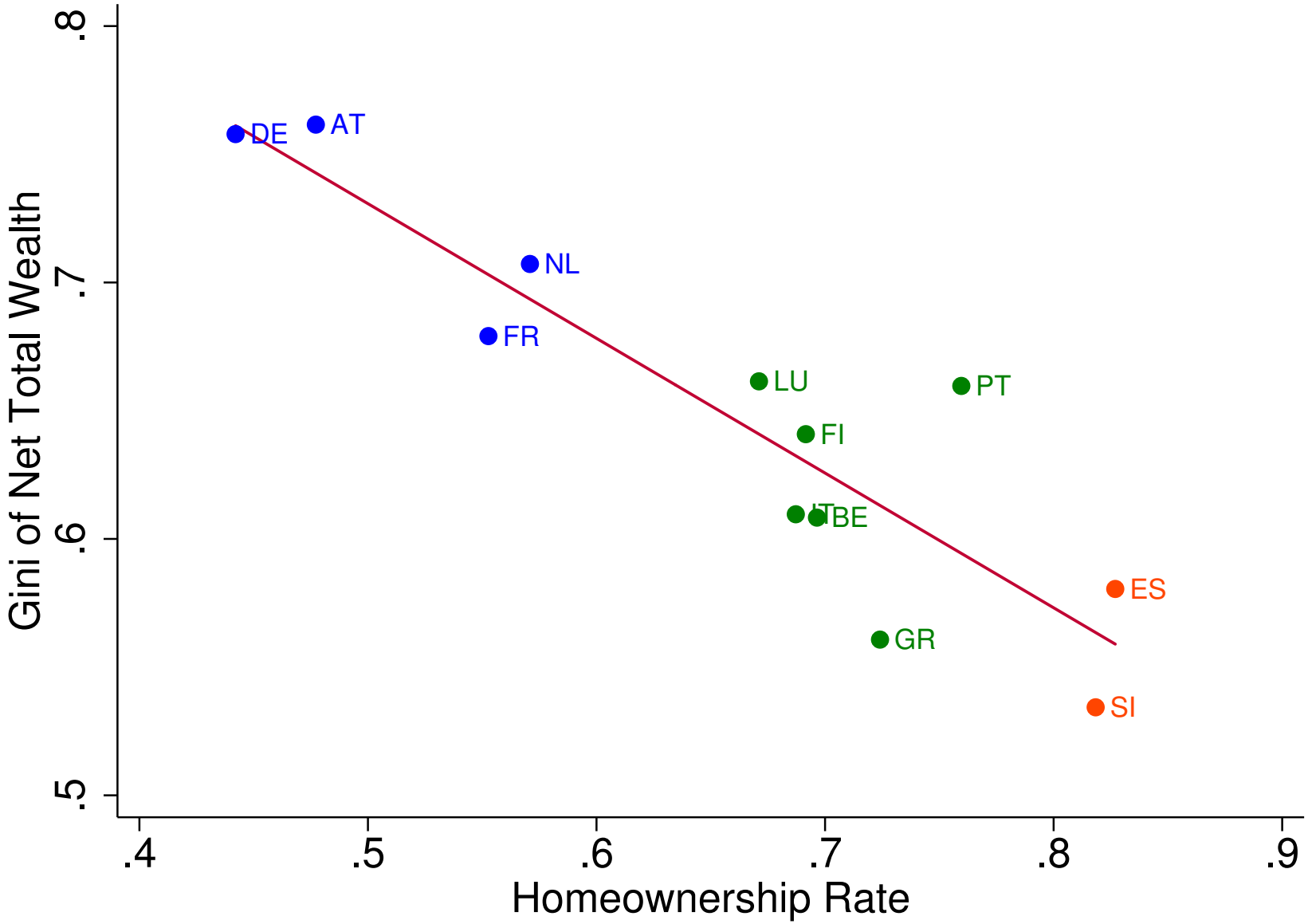


Conclusion

Conclusion

- Wedge on the rental market can explain the negative correlation between wealth inequality and the homeownership rate across countries
- Our model suggests that countries with very high homeownership rates could benefit from policies aimed at making rental markets work better
- High wealth inequality doesn't necessarily mean lower welfare

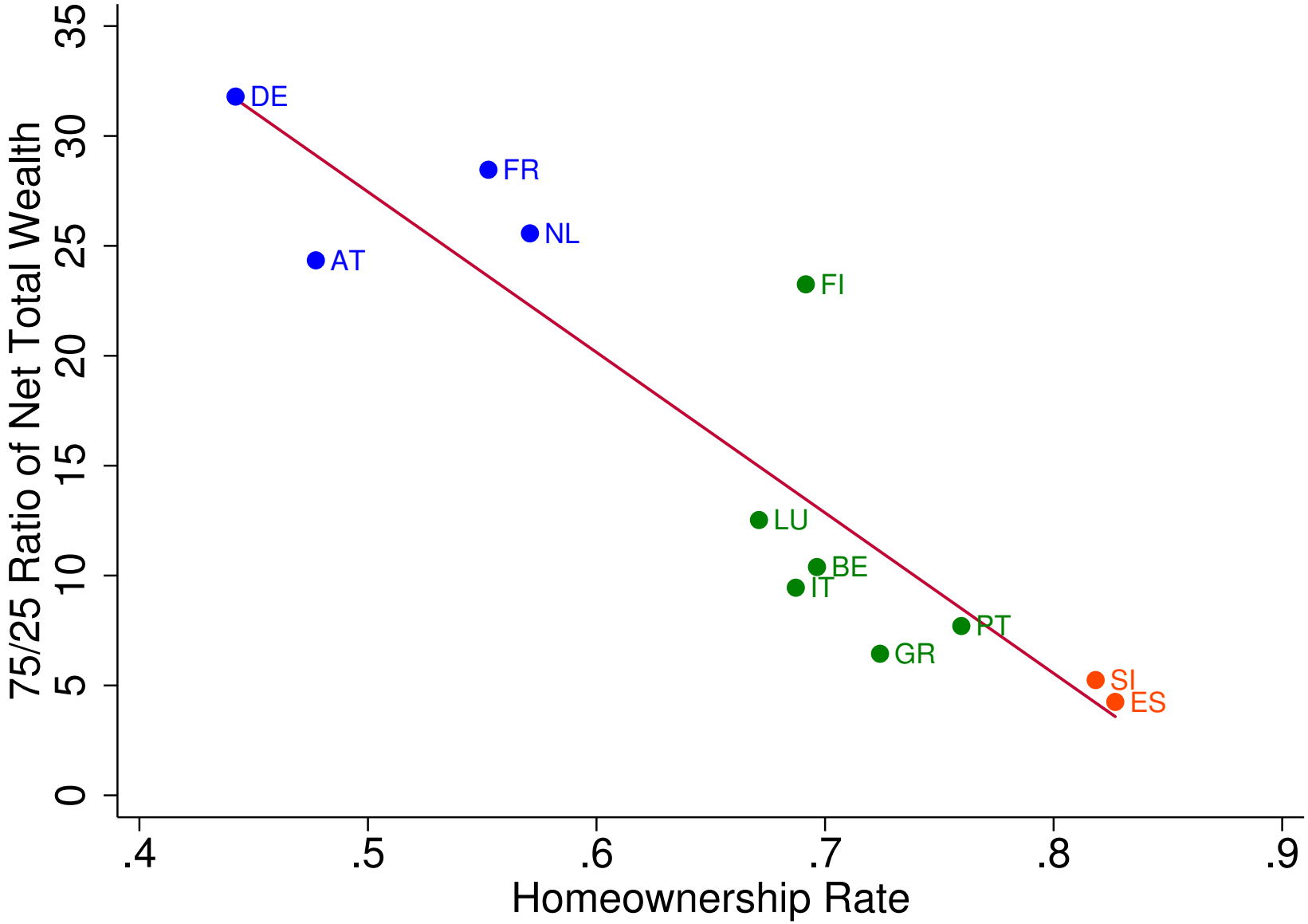
Gini Index



$\beta = -0.5253^{***}$ / $R^2 = 0.81$

back

p75/p25 Ratio



$\beta = -73.0202^{***}$ / $R^2 = 0.81$

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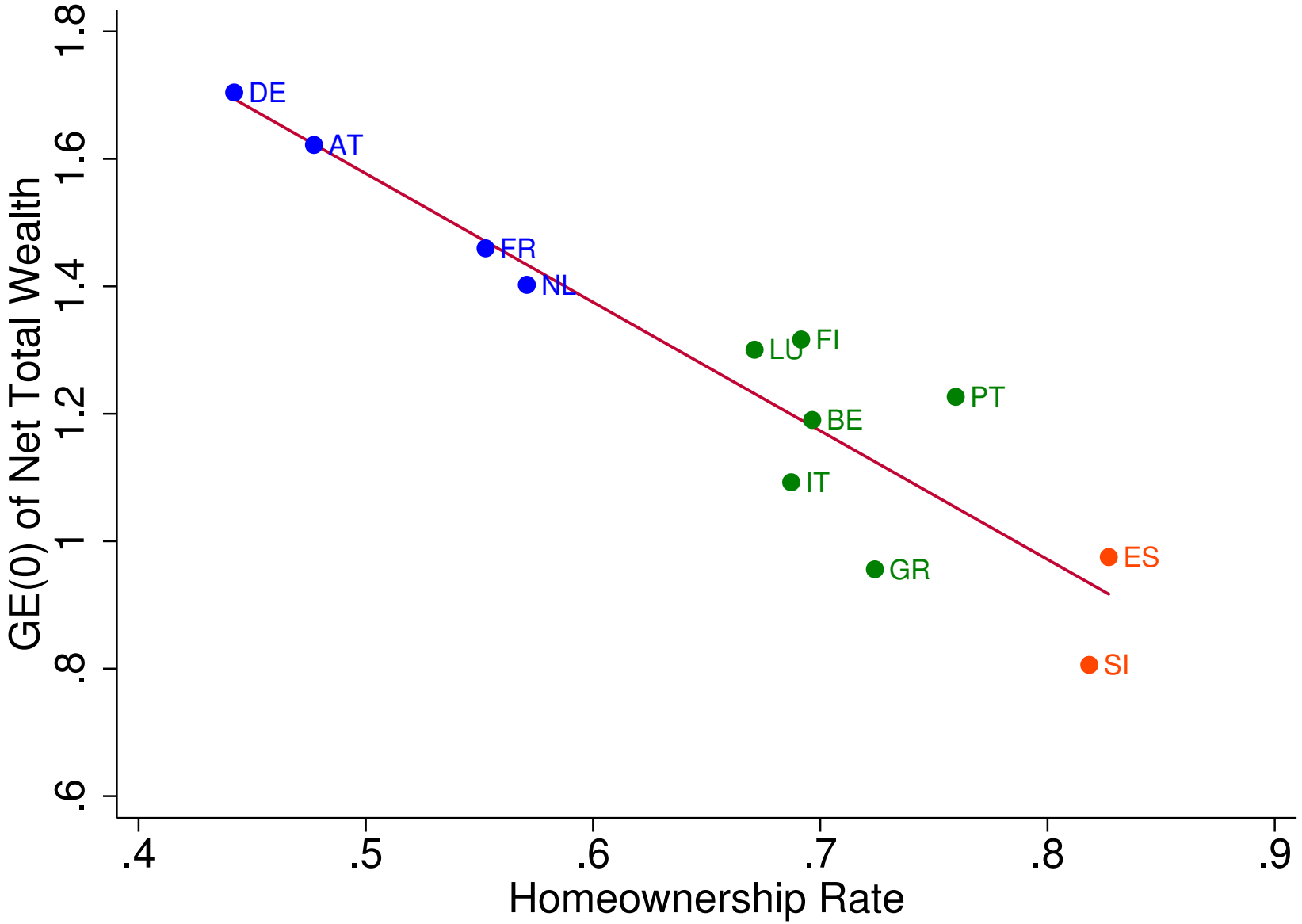
Total Population incl. Top 1%



$$\beta = -2.0186^{***} \quad / \quad R^2 = 0.86$$

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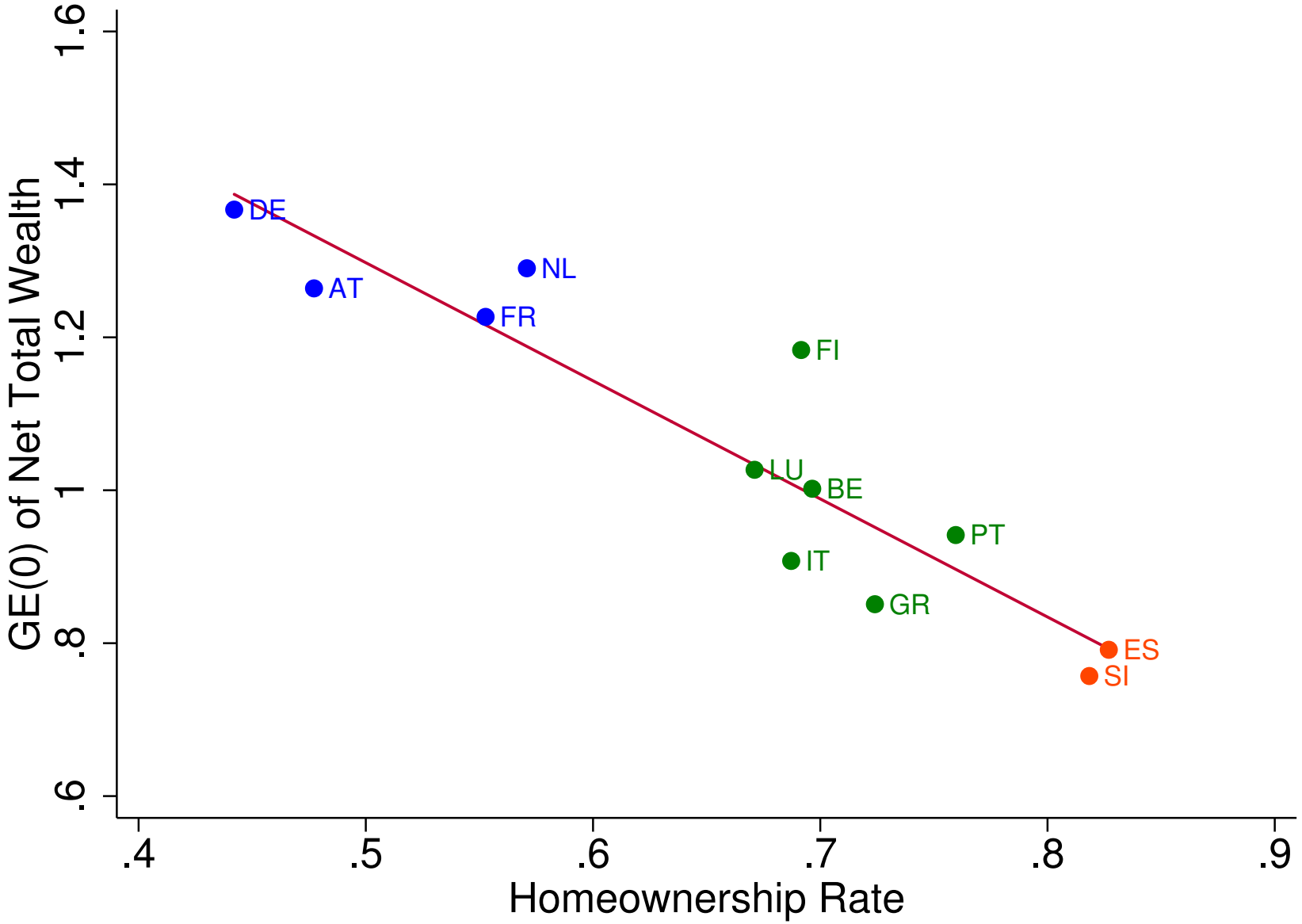
Bottom 95% of the Population



$$\beta = -1.5445^{***} \quad / \quad R^2 = 0.85$$

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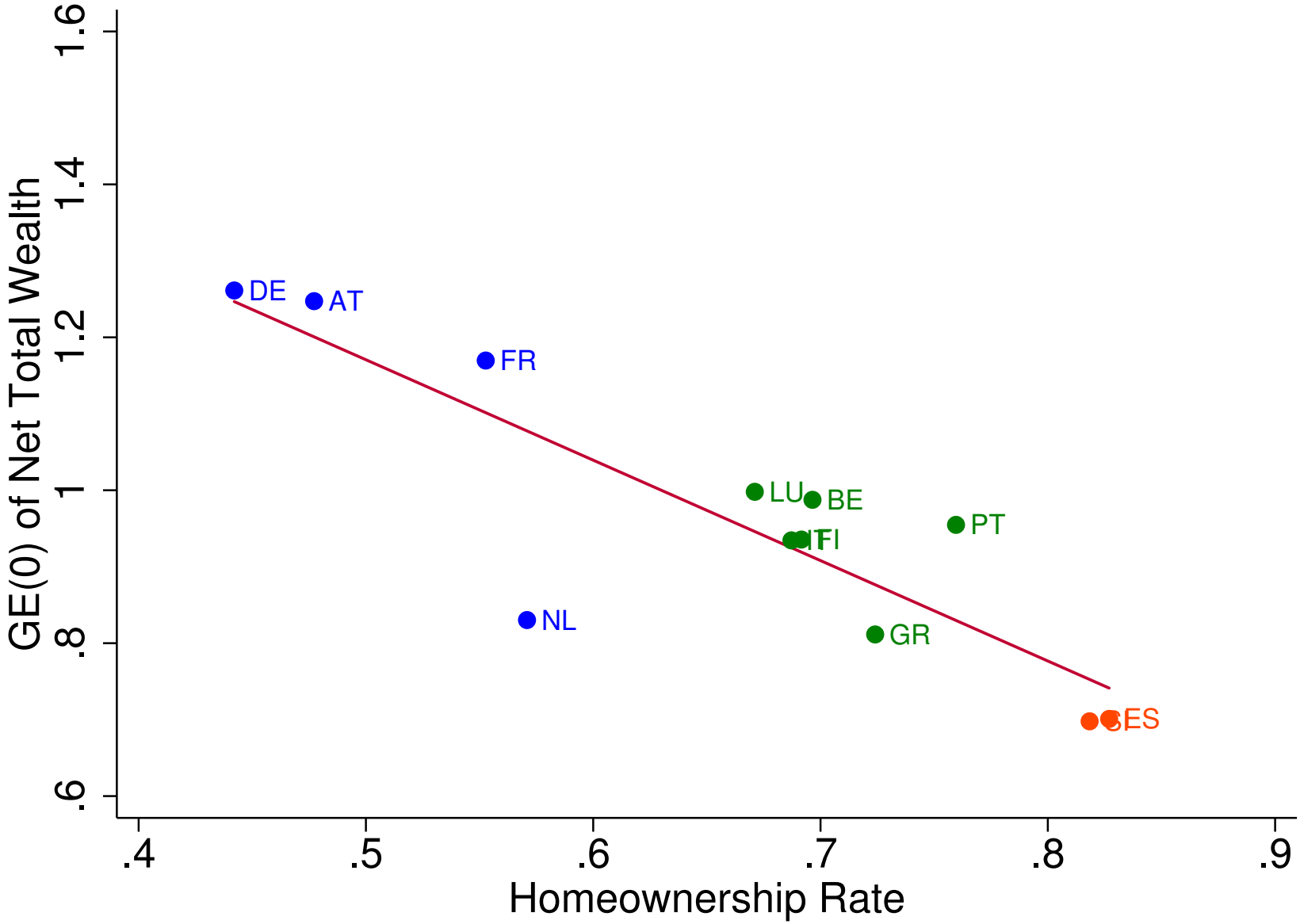
Only Households with Positive Wealth



$\beta = -1.3132^{***}$ / $R^2 = 0.74$

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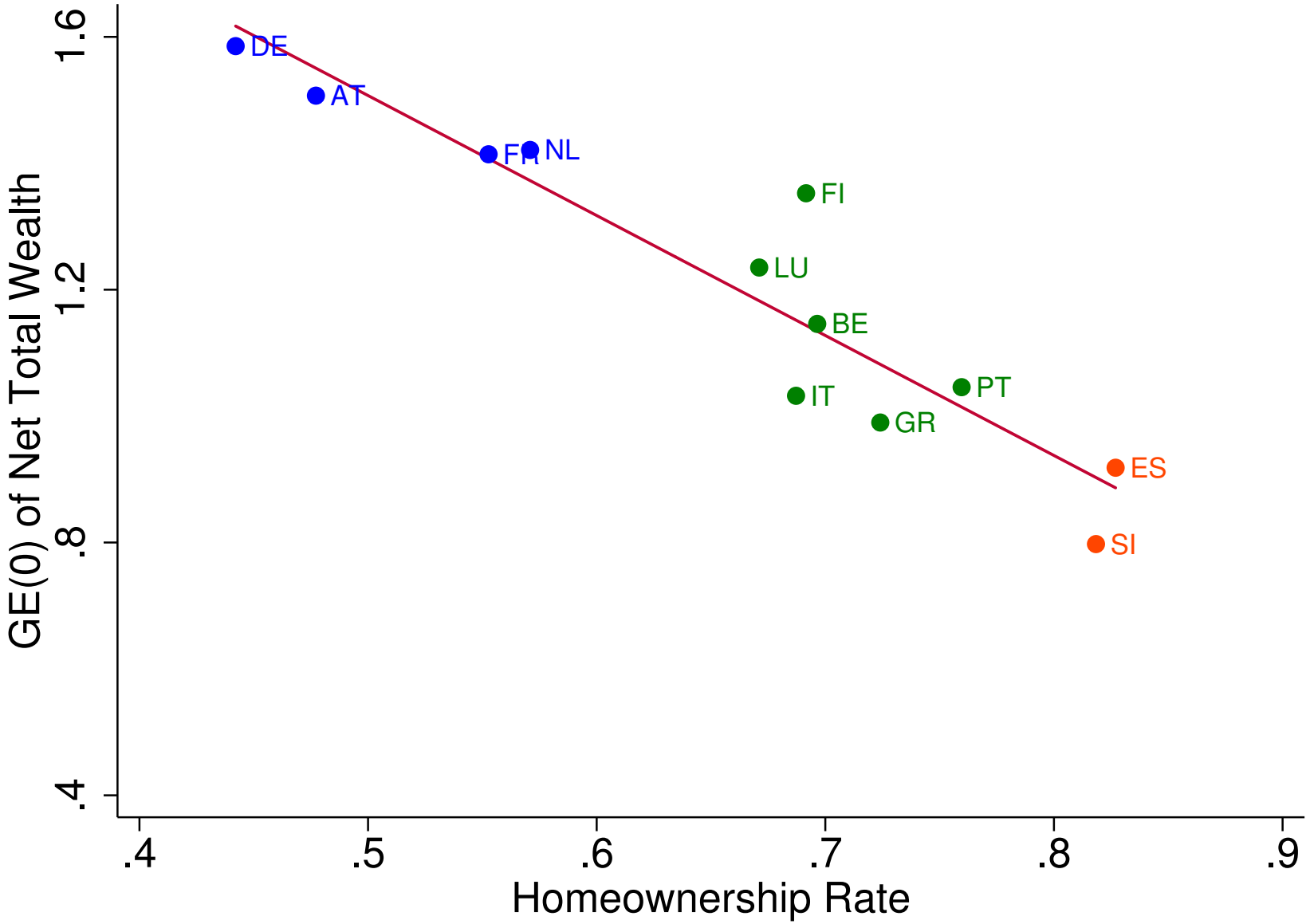
Only Households Aged 65 or Younger



$\beta = -1.8980^{***}$ / $R^2 = 0.88$

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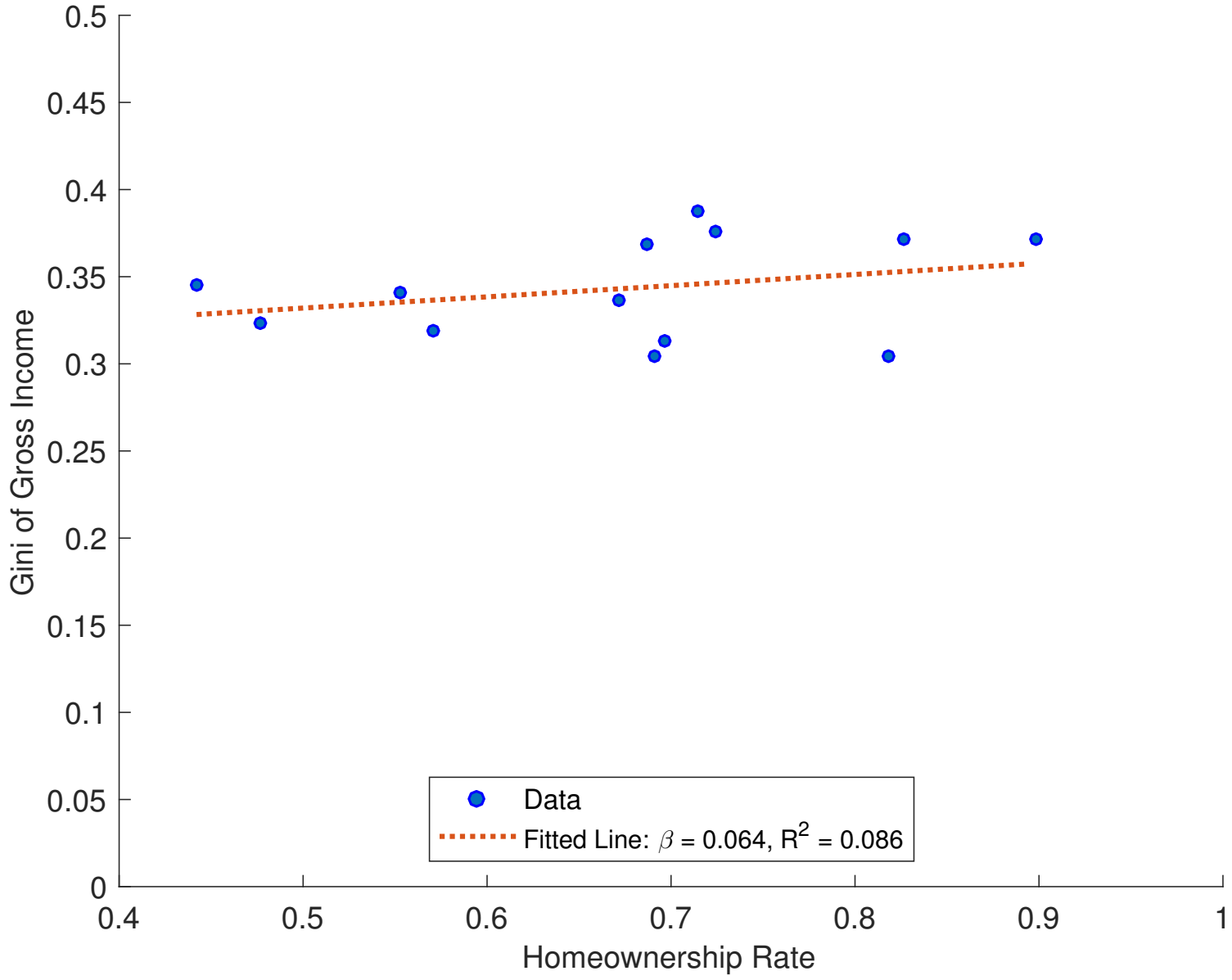
Income and Homeownership (OECD Data)



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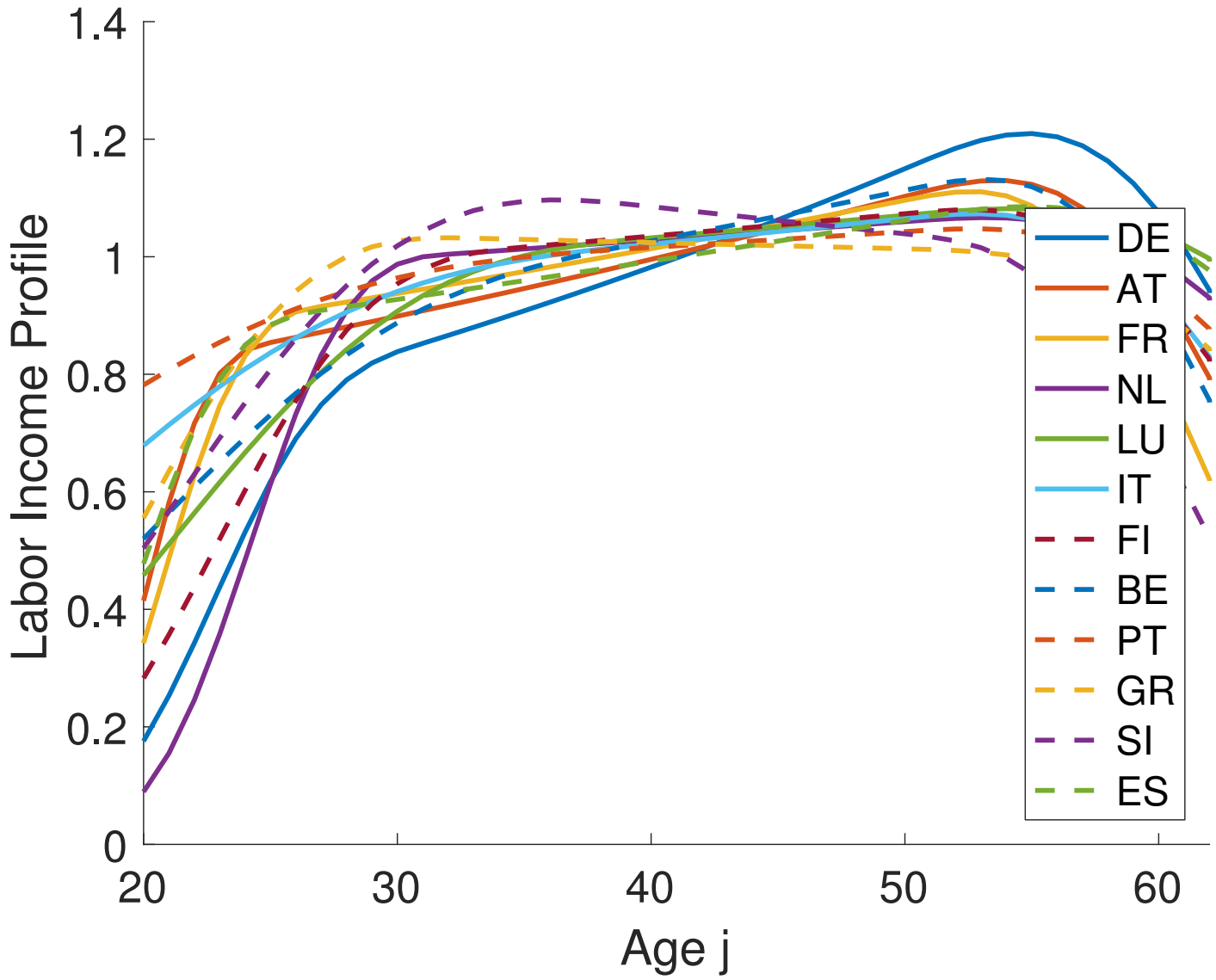
Calibration: Life-Cycle Income Profiles



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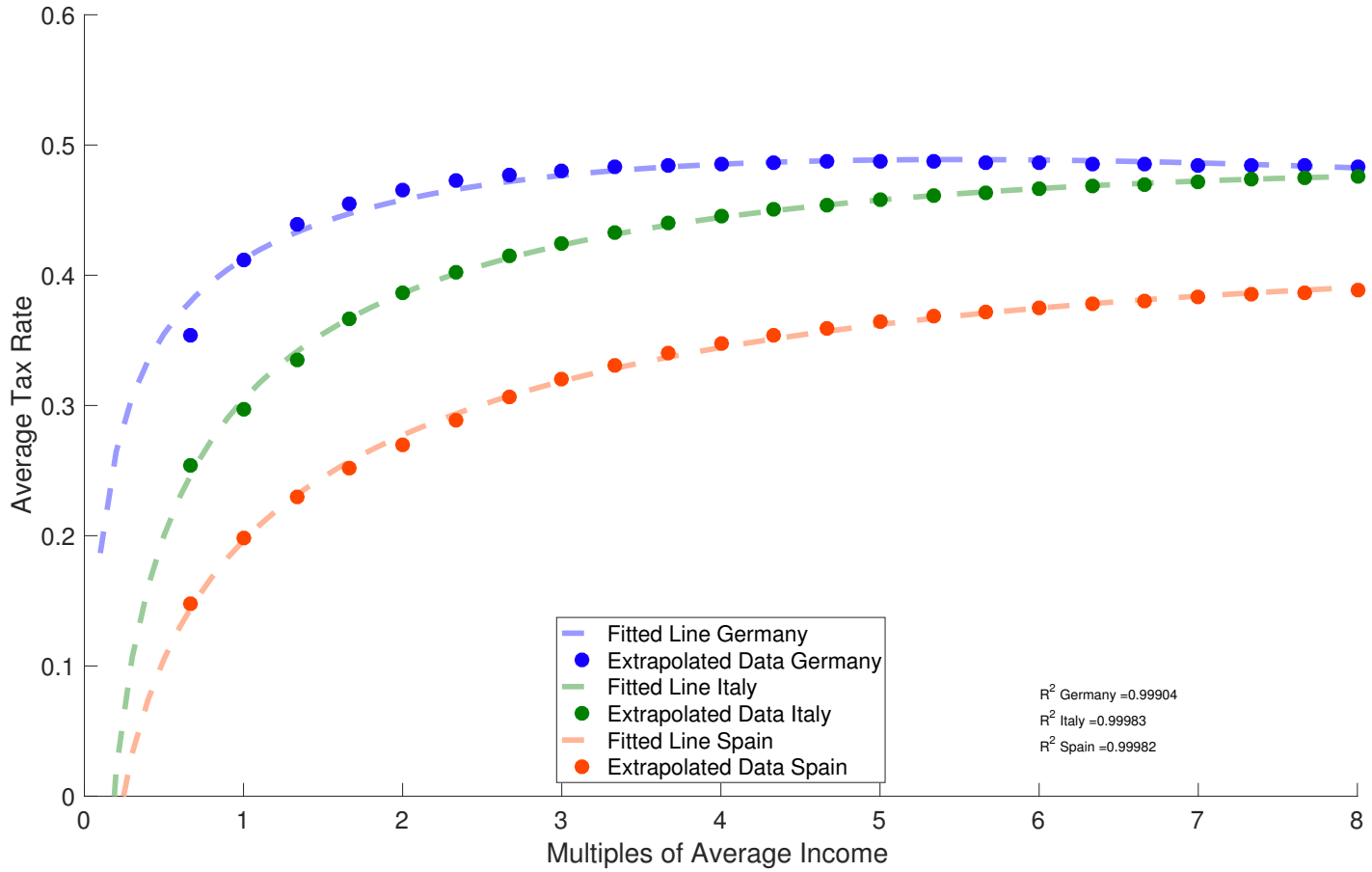
Calibration: Income Risk

Country	σ_ε^2
Germany	0.05610
Austria	0.04638
France	0.05884
Netherlands	0.04686
Luxembourg	0.05914
Italy	0.04591
Finland	0.04706
Belgium	0.06670
Portugal	0.04120
Greece	0.06001
Slovenia	0.05604
Spain	0.04280

back

Calibration: Taxes

Tax function: $t^c(y) = \frac{T^c(y)}{y} = t_0^c + t_1^c \cdot \frac{y_i}{\bar{y}^c} + t_2^c \cdot \left(\frac{y_i}{\bar{y}^c}\right)^{\phi^c}$



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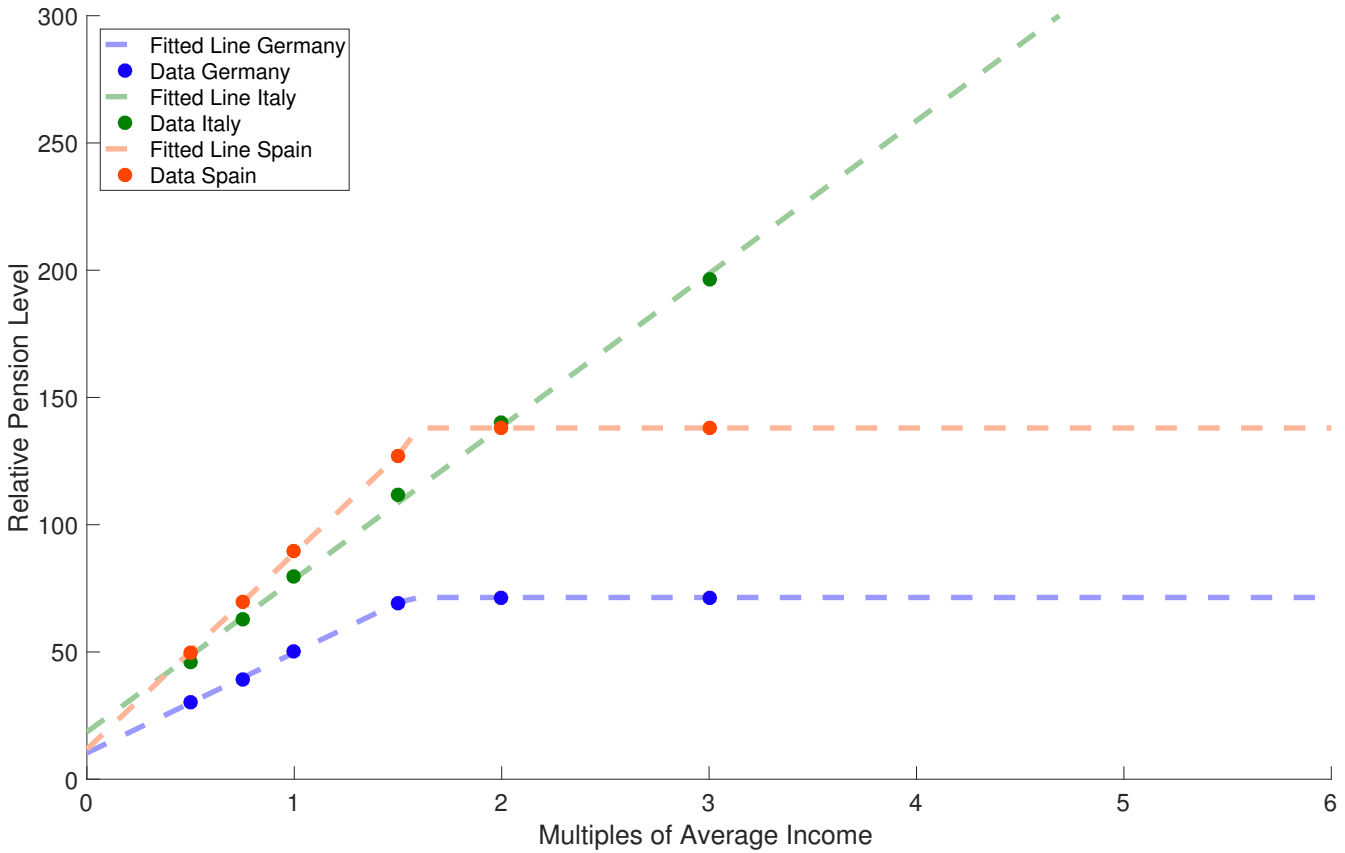
Calibration: Pensions

Pension payments: $$p^c(\bar{y}) = \begin{cases} a_1^c \bar{y}^c + b_1^c \bar{y}^i & \text{if } \bar{y}^i \leq \tilde{y}^c \\ a_2^c \bar{y}^c + b_2^c \bar{y}^i & \text{if } \bar{y}^i > \tilde{y}^c \end{cases}$$



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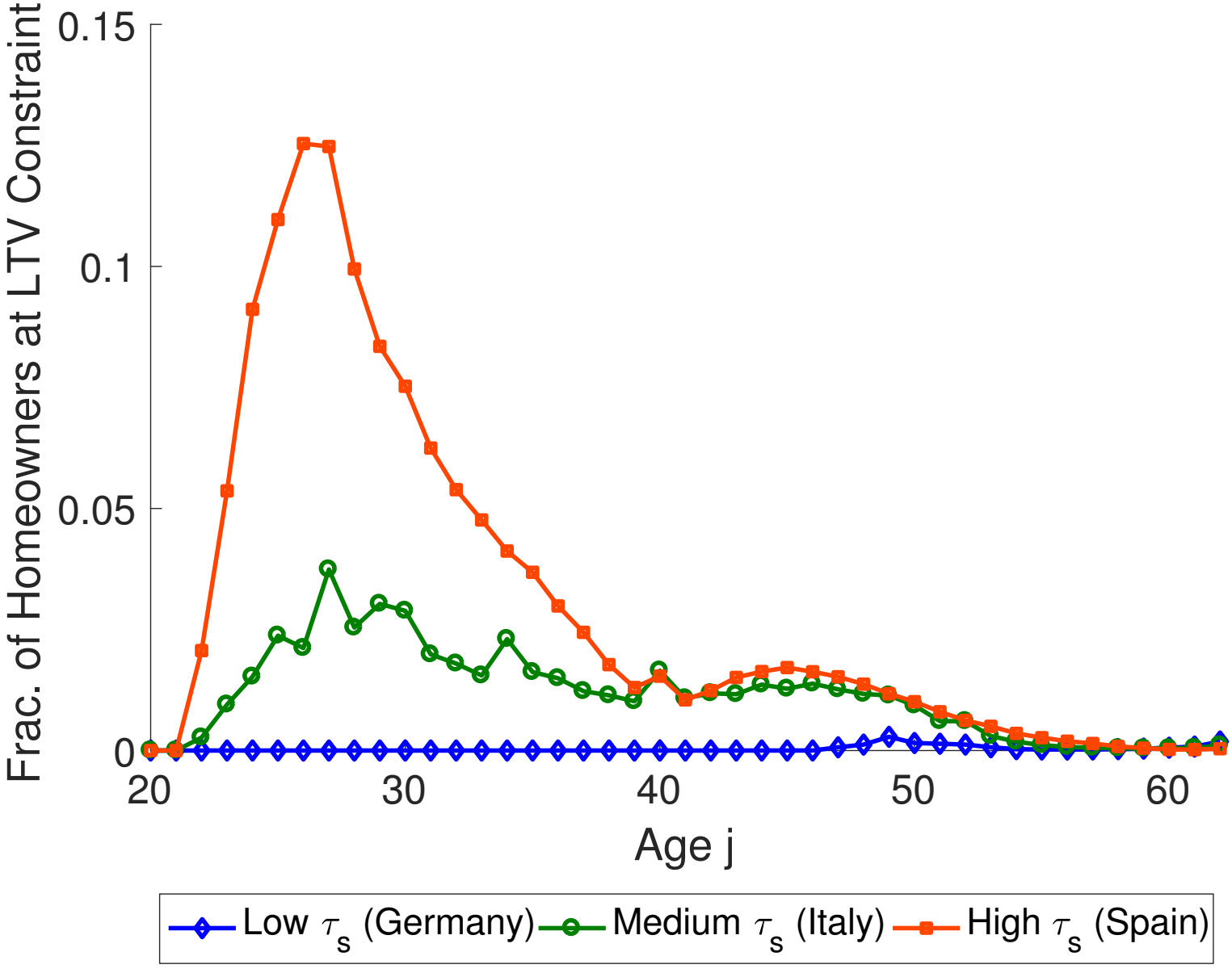
LTV Constraint



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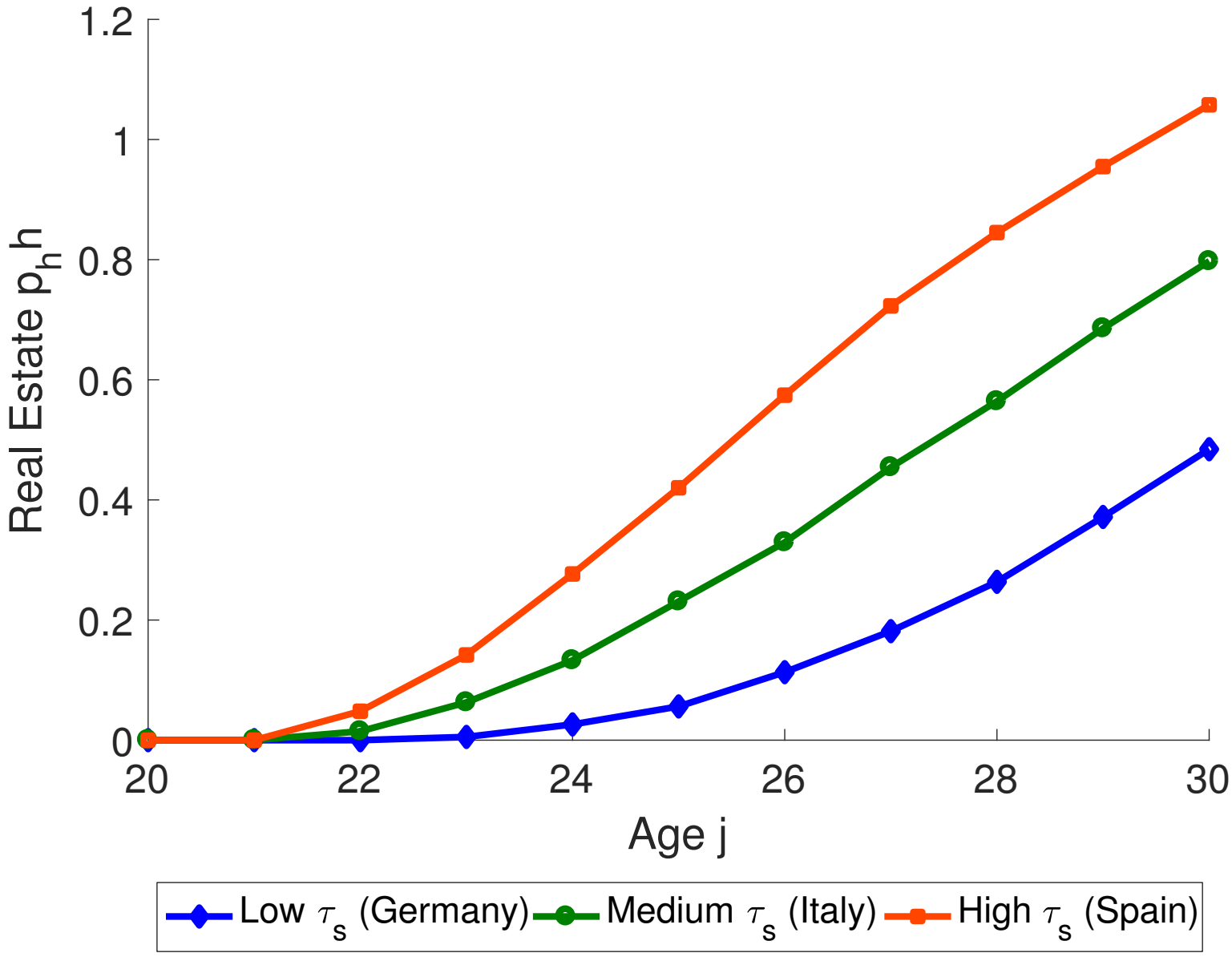
Real Assets



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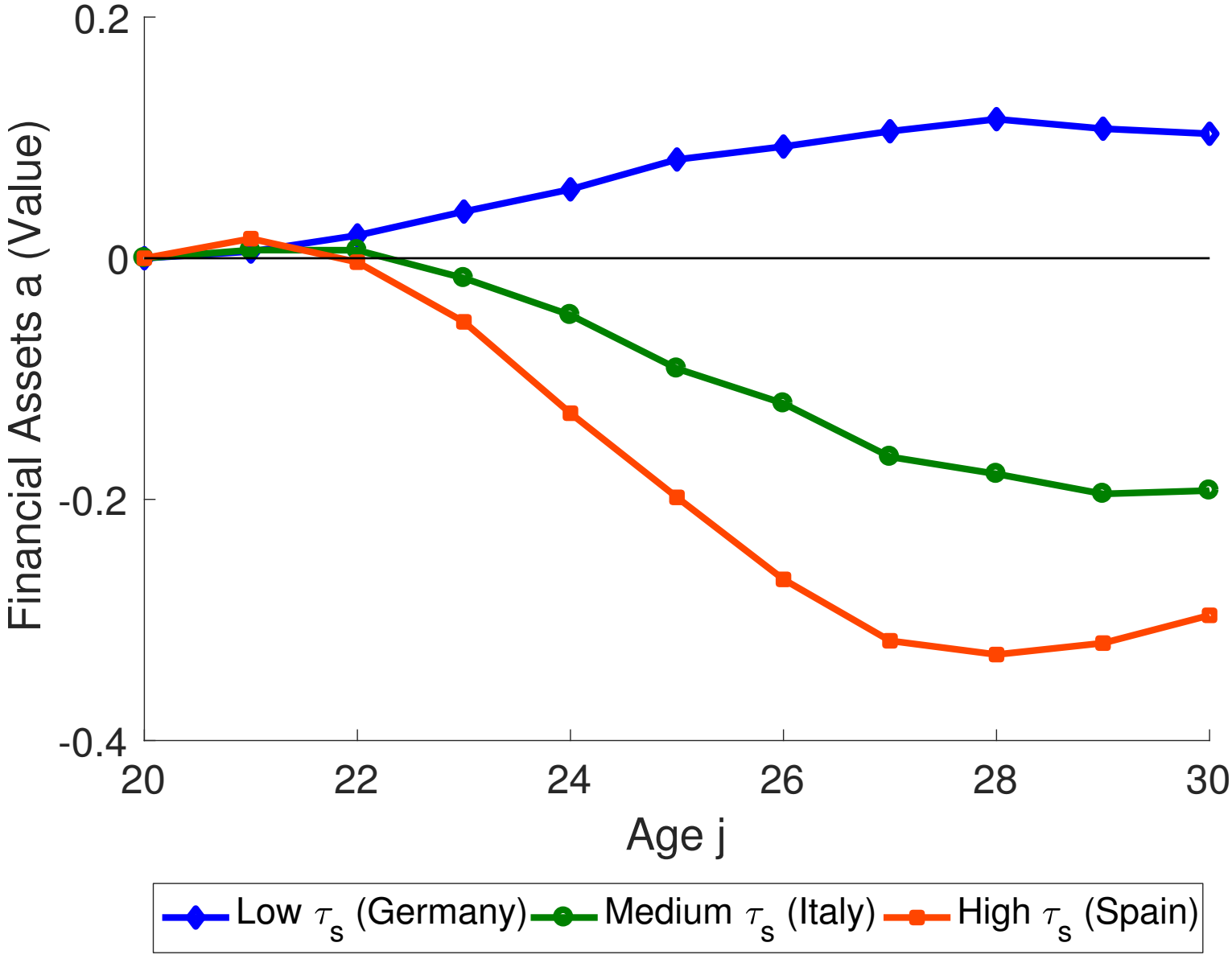
Financial Assets



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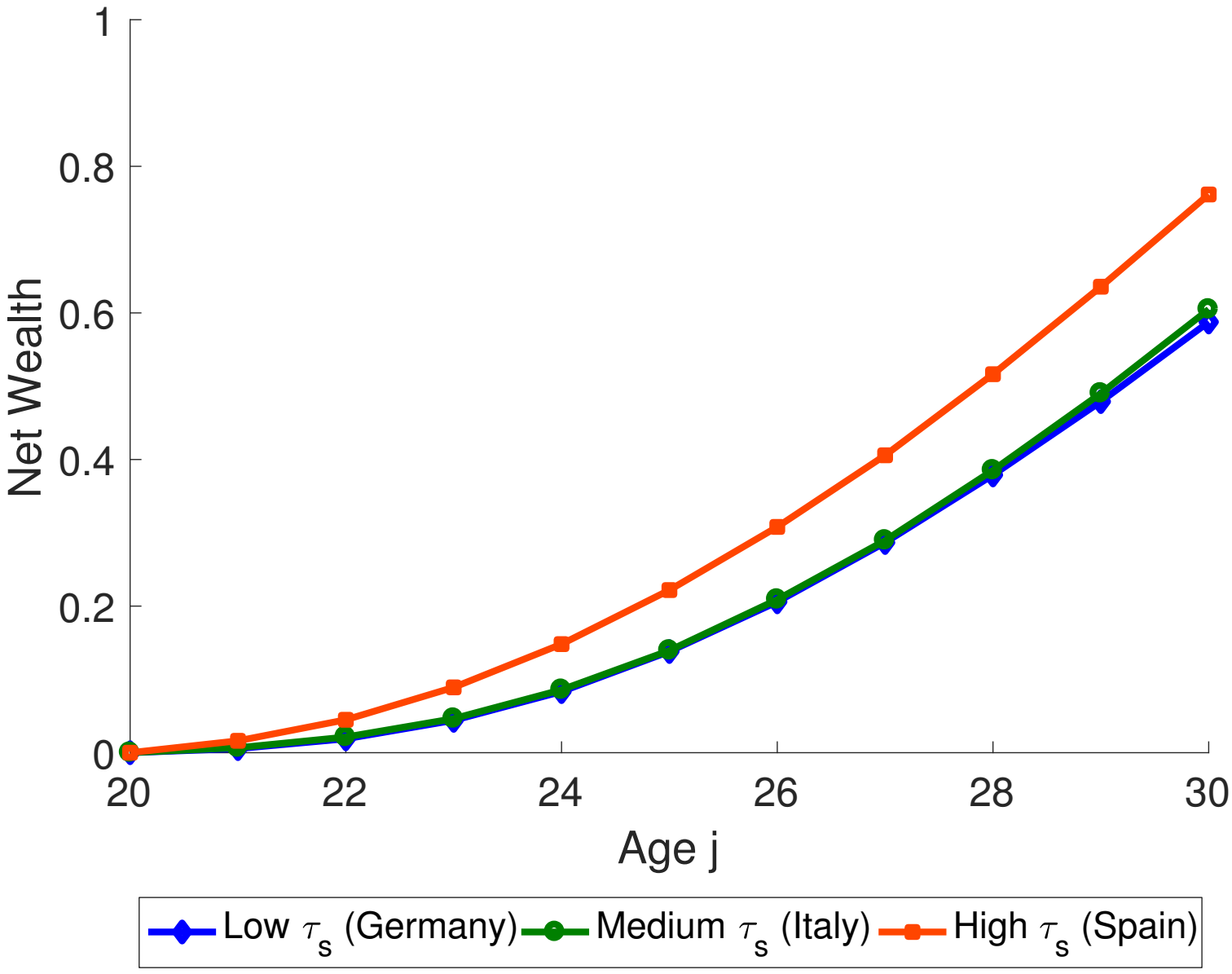
Net Wealth



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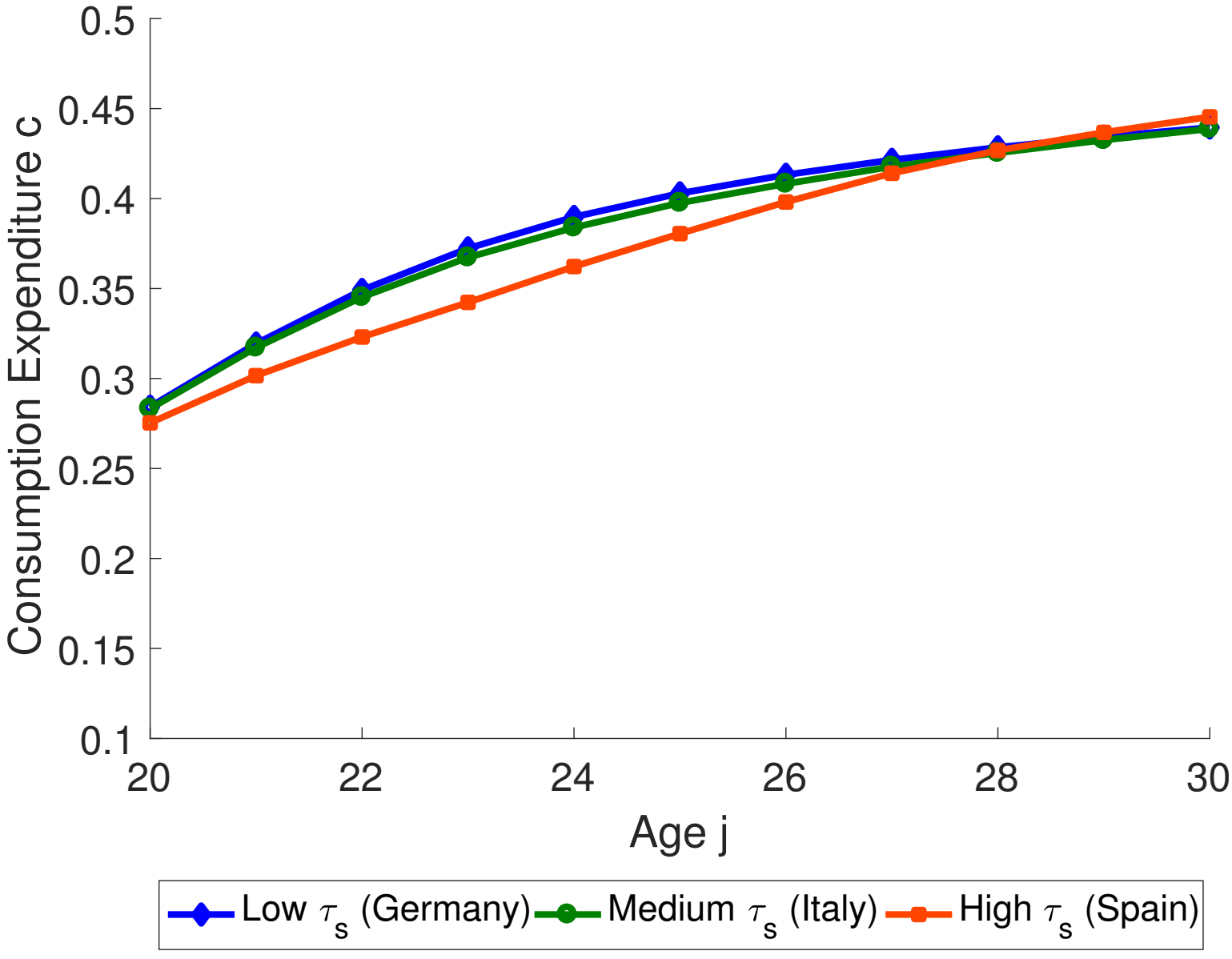
Consumption



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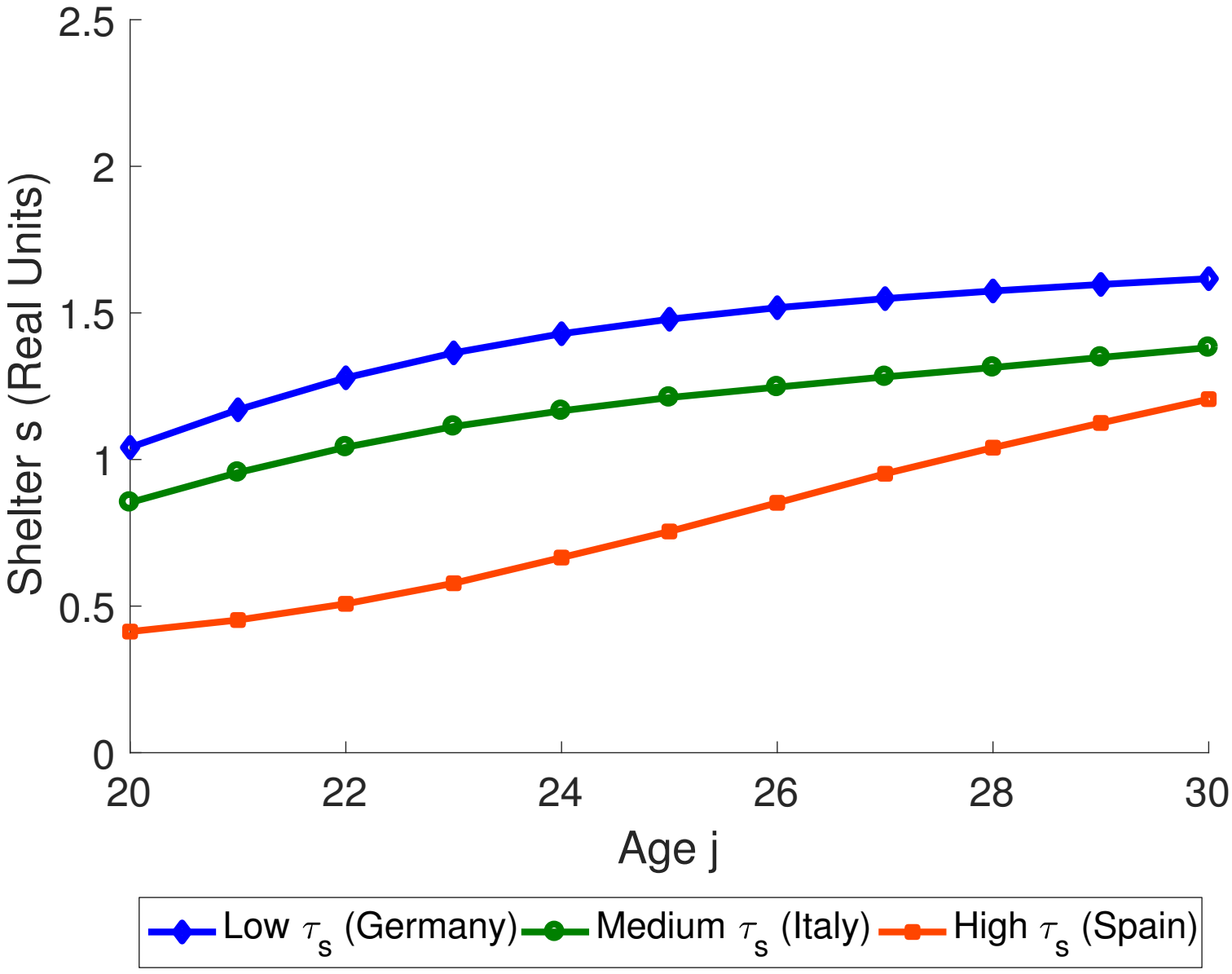
Shelter



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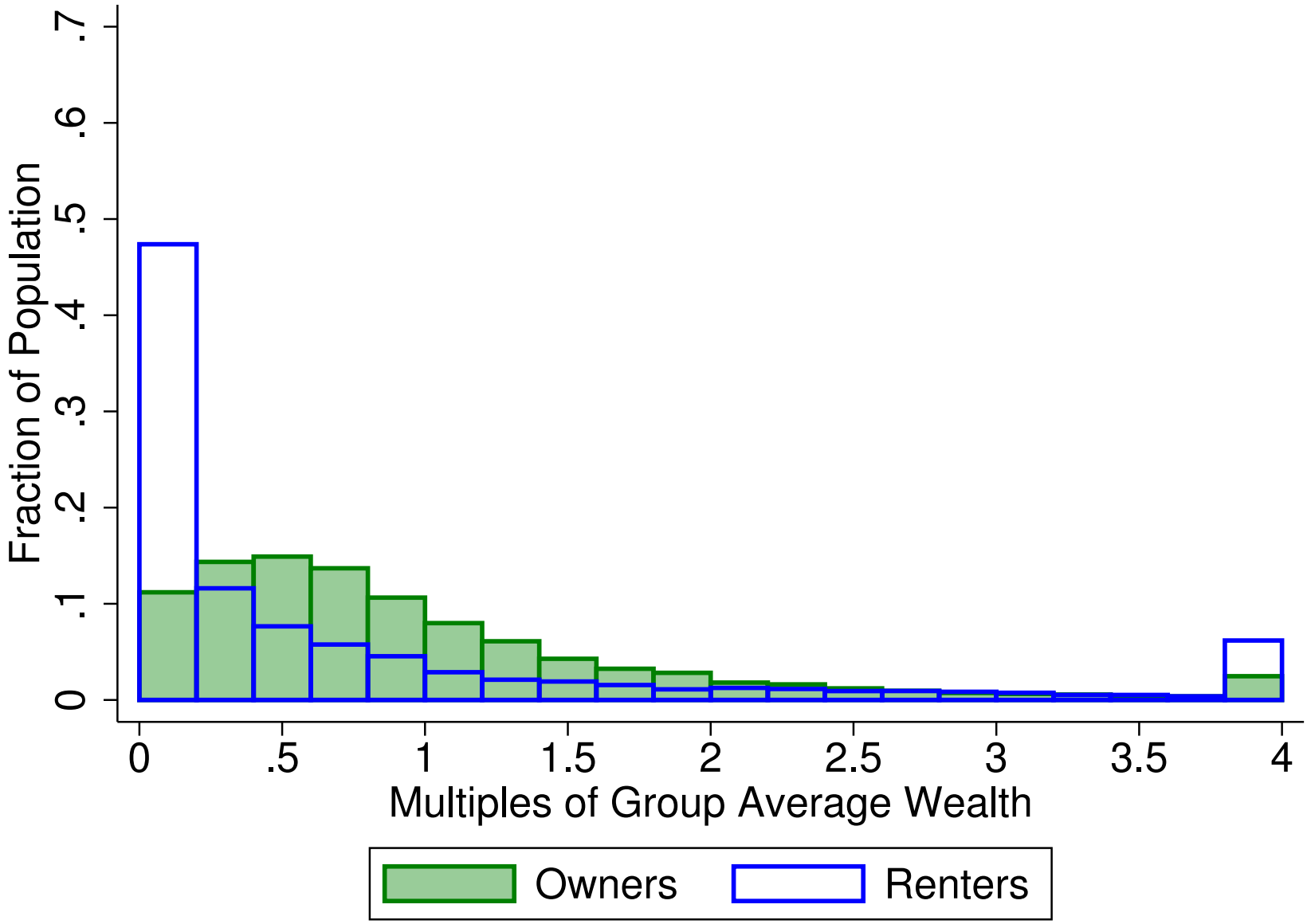
Countries with Low Homeownership Rate



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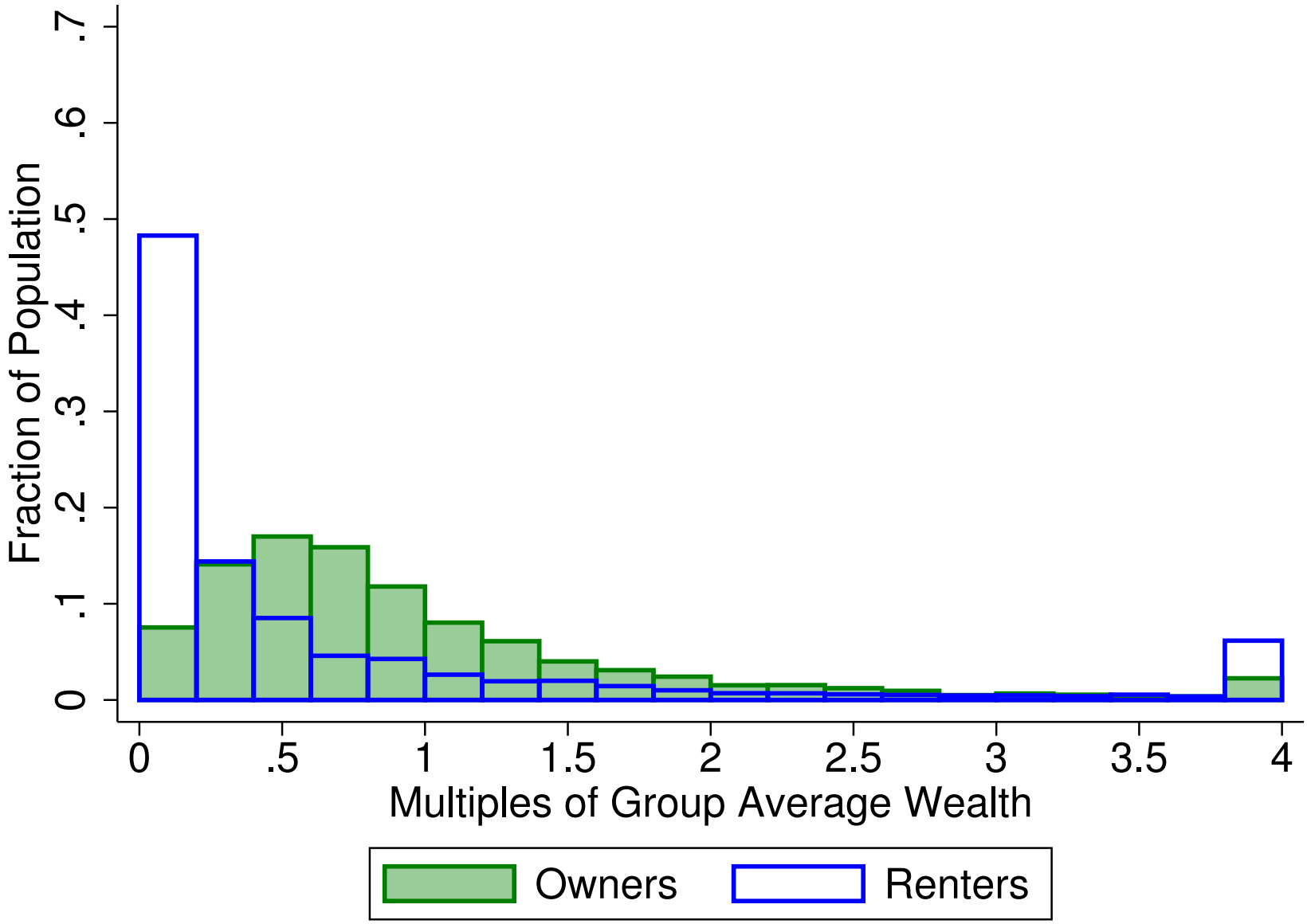
Countries with Medium Homeownership Rate



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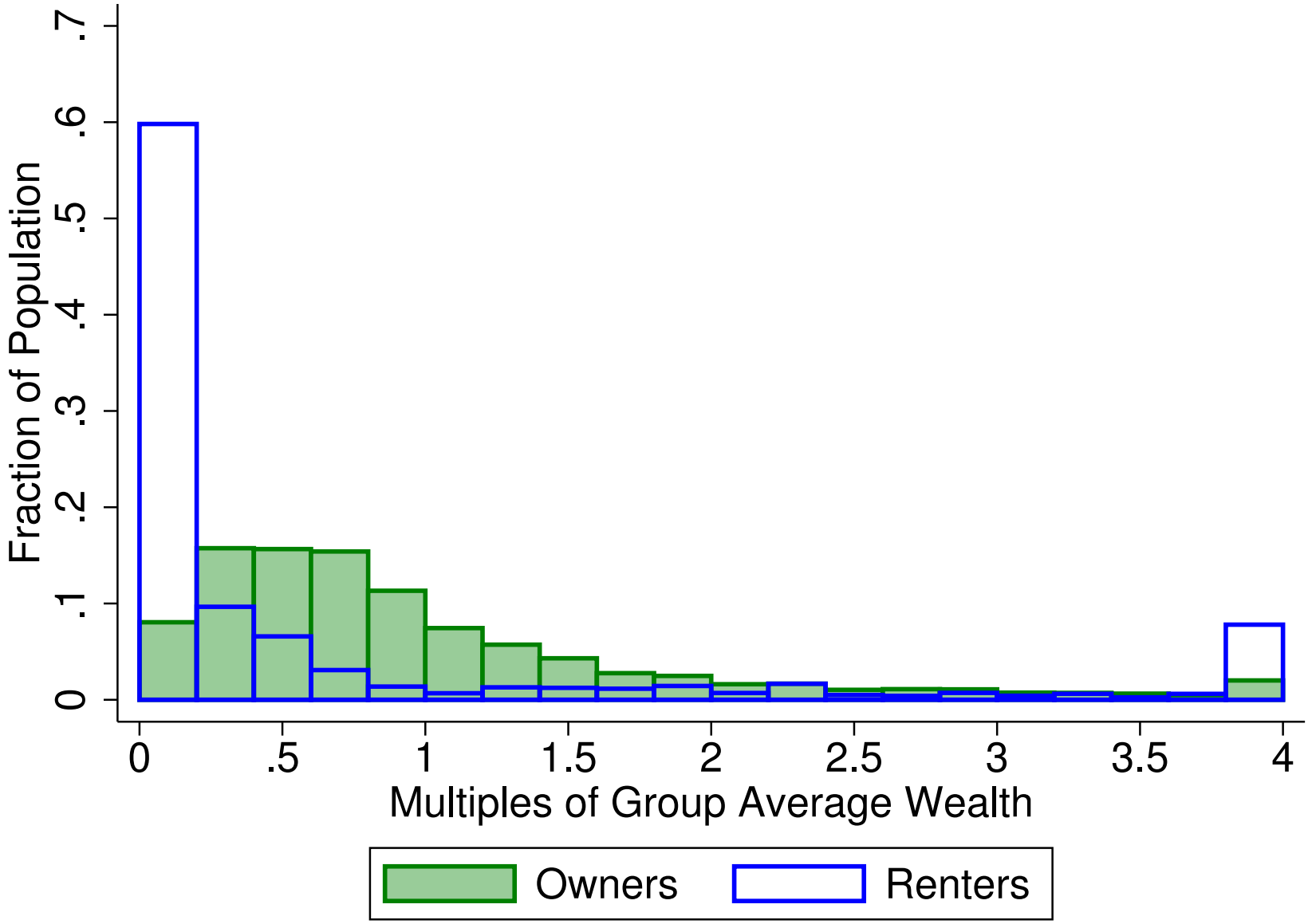
Countries with High Homeownership Rate



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A Decomposition in Levels

- Define for subgroups $g = r, o$:

$$WR_g^c = \log\left(\frac{\bar{w}^c}{\bar{w}_g^c}\right) \quad \text{and} \quad GE_g^c = -\frac{1}{N_g^c}\sum_{i \in \mathcal{N}_g^c} \log\left(\frac{w_i^c}{\bar{w}_g^c}\right).$$

- Then we can write

$$GE^c = \underbrace{HR^c \cdot WR_o^c + (1 - HR^c) \cdot WR_r^c}_{\text{between group inequality}}$$

$$+ \underbrace{HR^c \cdot GE_o^c + (1 - HR^c) \cdot GE_r^c}_{\text{within group inequality}}$$

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A Decomposition in Changes

- Define deviations from (simple) cross-country mean as

$$\omega_g^c = WR_g^c - \overline{WR}_g \ , \ \gamma_g^c = GE_g^c - \overline{GE}_g \ , \ \eta^c = HR^c - \overline{HR}$$

- We can write

$$\Delta GE^c := GE^c - \overline{GE} = \Delta_b^c + \Delta_w^c$$

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A Decomposition in Changes

- Define deviations from (simple) cross-country mean as

$$\omega_g^c = WR_g^c - \overline{WR}_g \ , \ \gamma_g^c = GE_g^c - \overline{GE}_g \ , \ \eta^c = HR^c - \overline{HR}$$

- We can write

$$\Delta GE^c := GE^c - \overline{GE} = \Delta_b^c + \Delta_w^c$$

with

$$\Delta_b^c = \overline{HR} \cdot \omega_o^c + (1 - \overline{HR}) \cdot \omega_r^c + \eta^c \cdot \left[\overline{WR}_o - \overline{WR}_r\right] + \eta^c \cdot \left[\omega_o^c - \omega_r^c\right]$$

$$\Delta_w^c = \underbrace{\overline{HR} \cdot \gamma_o^c + (1 - \overline{HR}) \cdot \gamma_r^c}_{\text{Variation in } GE} + \underbrace{\eta^c \cdot \left[\overline{GE}_o - \overline{GE}_r\right]}_{\text{Variation in } HR} + \underbrace{\eta^c \cdot \left[\gamma_o - \gamma_r\right]}_{\text{Interaction}}$$

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Between-Within Decomposition of Changes

	Explains (in %)
Between Δ_b^c	**36.1**
Within Δ_w^c	**63.9**
Variation in GE	9.8
Variation in HR	56.5
Interaction	–2.4

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