

# Correlated Beliefs and Lifecycle Behavior

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# Motivation

- Suppose an individual is **over-optimistic** about their future :
  - Optimism about **future income** =  $\uparrow$  **consumption** today
  - Optimism about **life expectancy** =  $\downarrow$  **consumption** today
  - If over-optimistic about both = effects may cancel out?
- Suppose this individual is also **over-optimistic** about markets:
  - Optimism about **stock returns**  $\implies \uparrow$  **stock share**
  - Optimism about **bond returns**  $\implies \downarrow$  **stock share**
  - If over-optimistic about all asset classes = portfolio share unchanged?

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  - If over-optimistic about all asset classes = portfolio share unchanged?

Whether beliefs offset or amplify each other  
depends on their **joint distribution**!

# This paper

Q: What is the **joint distribution** of household subjective expectations and what does it imply for **lifecycle behavior**?

Challenge: Need data on multiple expectations  $\times$  framework to study their interaction

## This paper:

- ① Survey economic beliefs across multiple domains in a balanced US sample
- ② Characterize the joint distribution & identify clusters of individuals w/ similar beliefs
- ③ Quantify implications for behavior and welfare using a lifecycle model:
  - **Positive:** correlations attenuate passthrough from beliefs to actions
  - **Normative:** correlations lower welfare cost of disagreement
  - **Policy:** correcting single beliefs can harm welfare

# Literature: Subjective Expectations and Household Behavior

## 1. Households' subjective expectations (Manski 2004)

- Increasingly elicited and used to discipline models of household behavior, but generally **one belief at a time**: stock returns (Velásquez-Giraldo 2024), earnings (Rozsypal and Schlafmann 2023), life expectancy (Heimer, Myrseth, and Schoenle 2019; O'Dea and Sturrock 2023), etc

→ **Contribution**: study **joint distribution** of beliefs in the data *and* in the model

## 2. Correlation between behavioral biases (Stango and Zinman 2023; Chapman et al. 2023)

- Study correlation btw. behavioral biases within individuals

→ **Contribution**: **expectations** rather than preferences + embedded in a lifecycle model

## 3. Attenuated responses to beliefs and fundamentals

- Choices respond **less** to beliefs than benchmarks predict (Giglio et al. 2021) due to cognitive imprecision (Enke et al. 2026) or lack of well-formed beliefs (Andre et al. 2026)

→ **Contribution**: Revisit the benchmark: correlated beliefs ↓ model-implied pass-through

# Outline

- 1 Theoretical Framework
- 2 Survey Design and Measurement
- 3 Four Facts About Correlated Beliefs
- 4 Life-cycle Model
- 5 Conclusion

# Consumption-Saving Decisions

- **Simple lifecycle model:** agent retires in period  $A_r$  and dies in period  $A$

$$\max \sum_{t=0}^{A-1} \beta^t \frac{c_t^{1-\sigma}}{1-\sigma}$$

$$s.t. \quad \sum_{t=0}^{A-1} \frac{c_t}{(1+r-i)^t} = \sum_{t=0}^{A_r-1} \frac{y}{(1+r-i)^t}$$

- **Agents have different beliefs:** but each is certain to be correct

|                                 |                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Future income                   | Life expectancy                 | Risk-free rate                  | Inflation rate                  |
| $\tilde{y} = (1 + \epsilon_y)y$ | $\tilde{A} = (1 + \epsilon_A)A$ | $\tilde{r} = (1 + \epsilon_r)r$ | $\tilde{i} = (1 + \epsilon_i)i$ |

- **Impact on consumption:** for small  $\epsilon$ , the consumption bias is:

$$\frac{\tilde{c}_0 - c_0}{c_0} \approx \epsilon_y - \phi_A A \epsilon_A - (\phi_{PI}^r + \phi_r (EIS - 1))(r \epsilon_r - i \epsilon_i)$$

where  $\phi_A > 0$  captures the sensitivity to life-expectancy,  $\phi_{PI}^r > 0$  the sensitivity of permanent income to the interest rate, and  $\phi_r (EIS - 1)$  substitution and wealth effect

# Framework Takeaways

- **Portfolio Choice:** What matters is beliefs about differences between asset returns

Details

## Main takeaways:

- Hard to identify beliefs from actions alone:  $\neq$  beliefs  $\rightarrow$  same behavior ([Manski 2004](#))
  - $\rightarrow$  Motivates directly eliciting expectations!
- Key expectations for lifecycle saving/investing decisions:
  - $\rightarrow$  Asset returns, inflation, labor market outcomes, life expectancy

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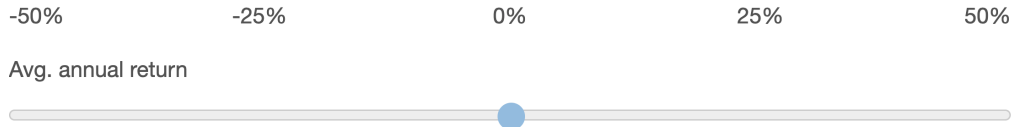
# Survey Design

**Goal:** Collect subjective expectations over key household finance outcomes

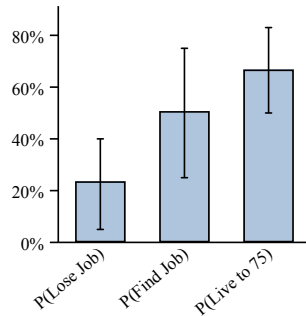
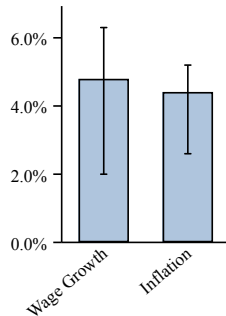
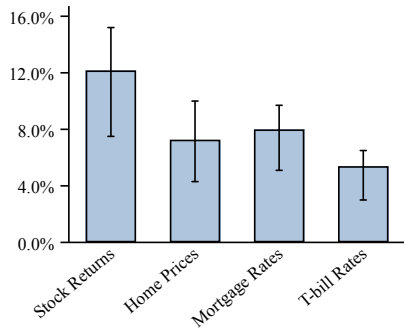
- Prolific survey: **July 2025, January 2026**, third wave in the field now
  - ~ 2,000 responses from Prolific sample balanced to the U.S. Census
  - 600 repeat respondents accross two waves
  - Include attention, comprehension, and LLM checks
- Elicit subjective expectations over:
  1. Stock returns
  2. Home prices
  3. Mortgage rates
  4. T-bill rates
  5. Inflation
  6. Life expectancy
  7. Wage growth
  8. Job loss
  9. Job finding
  10. Perceived correlations
- Additional questions: demographics, employment, income, financial literacy (big 4), psychological outlook (Scheier and Carver 1985), LLM-led qualitative interviews

# Survey Design

Imagine as a long term investment you invest in the **S&P 500 stock market index fund** (a fund that follows the performance of 500 of the largest publicly traded companies in the U.S). If you held that fund for the next **20 years**, what **average annual return** would you expect?



# Average Expectations



Age

Income

Employment Status

Gender

Race

Financial Literacy

# Measurement Error: Strategy

**Concern.** Measurement error biases estimated correlations *toward zero*.

**Strategy.** Randomly re-elicite each expectation *twice within* the same survey session.

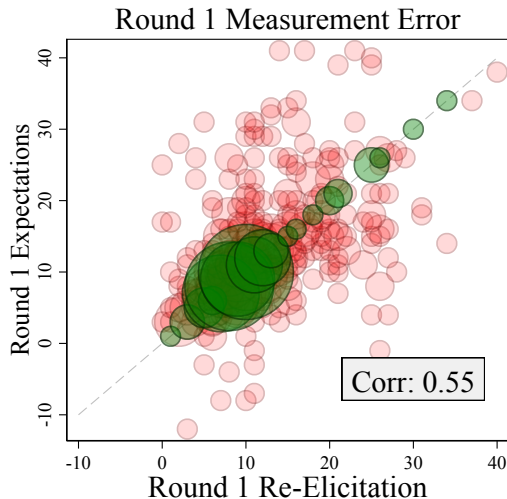
- Within-session disagreement  $\Rightarrow$  response noise

**Classical error model:**  $x_{ir} = \mu_{ir} + \varepsilon_{ir}$

$$\underbrace{\text{Var}(x_{ir})}_{\text{observed}} = \underbrace{\text{Var}(\mu_{ir})}_{\text{true belief}} + \underbrace{\text{Var}(\varepsilon_{ir})}_{\text{noise}}$$

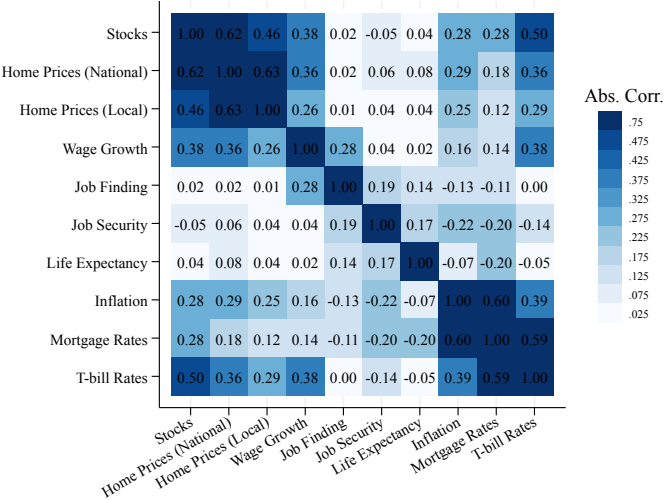
$$\widehat{\text{Var}}(\varepsilon_{ir}) = \frac{1}{2} \text{Var}(x_{ir} - x'_{ir})$$

## Measurement Error: Result



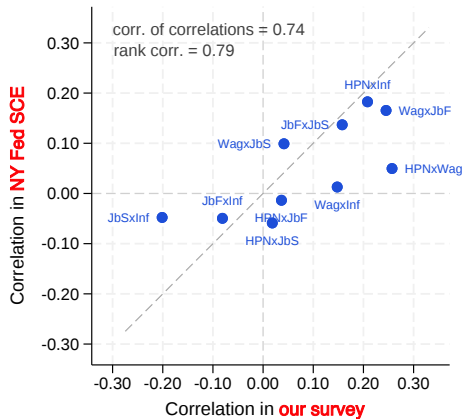
- Measurement error is ↓ in confidence Confidence and financial literacy FinLit.

# Measurement Error Correction of Correlations



# External Validation: NY Fed SCE

5 belief domains elicited comparably in both surveys (10 pairs)



Domains: wage growth (Wag), job finding (JbF), job security (JbS), inflation (Inf), national home prices (HPN)

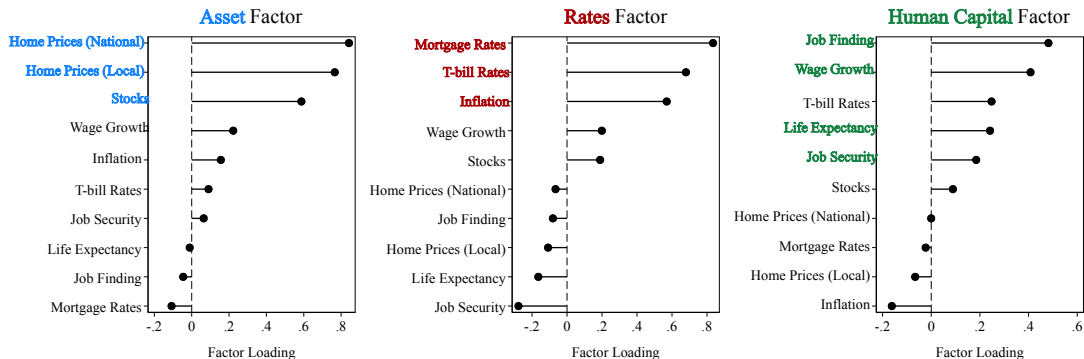
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# Four Facts About Correlated Beliefs

**Fact 1.** Beliefs *co-move* along three common factors

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**Three factors capture 87% of the co-movement across the ten expectations**

Mean absolute pairwise correlation: 0.22 in the data, 0.03 after removing the three factors

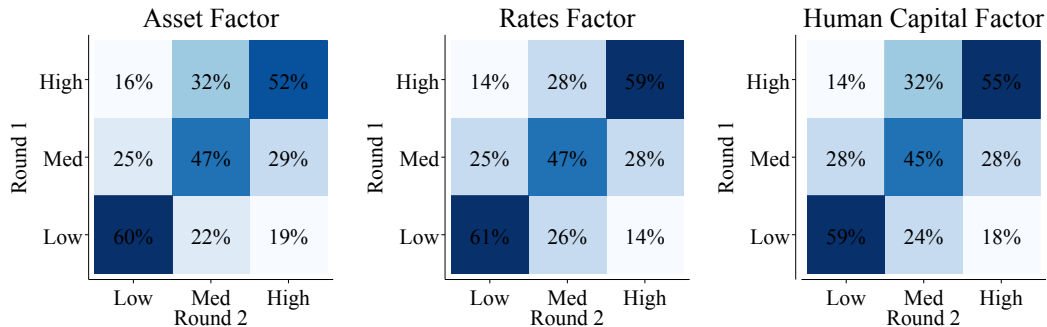
Common factor analysis after [Stango and Zinman 2023](#). Own-outcome expectations residualized on age & inc.

# Four Facts About Correlated Beliefs

Fact 1. Beliefs *co-move* along three common factors

**Fact 2.** Beliefs are *highly persistent* within individuals

## Fact 2. Beliefs are highly persistent within individuals



Tercile-to-tercile transitions across 6 months; persistence on the diagonal

- Diagonal share  $\approx$  50–60% across all three factors
- Transitions are *monotone* – long jumps are rare

# Four Facts About Correlated Beliefs

**Fact 1.** Beliefs *co-move* along three common factors

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**Fact 3.** Belief types align with *psychological optimism*

### Fact 3. Belief types align with psychological optimism



- **Independent validation:** three-item dispositional-optimism index based on (Scheier and Carver 1985). Percentile rank of each respondent's avg. response. [Questions](#)
- $\neq$  **Not explained away by demographics:** [Age](#) or [Income](#).

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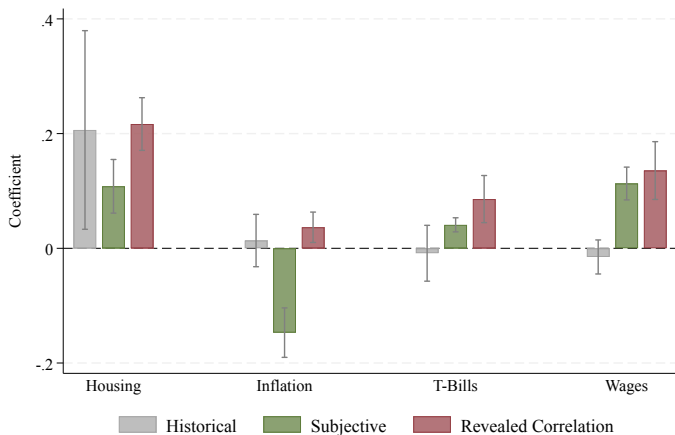
**Fact 2.** Beliefs are *highly persistent* within individuals

**Fact 3.** Belief types align with *psychological optimism*

**Fact 4.** Perceived correlations *depart* from historical ones

## Fact 4. Perceived correlations often depart from historical ones

*"In a year when stocks do unusually {well/badly} (about 10 pp {more/less} than you expected), would {outcome} grow faster than usual, slower than usual, or about the same?"*



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# Lifecycle Model

**Standard lifecycle framework:** CRRA over consumption & housing services

- **Economic environment:**

- ① **Asset markets:** Housing (30y fixed mortgages), stocks, and one-period bond
- ② **Labor market:** Stochastic earnings (AR(1)) w/ unemployment and job-job transitions
- ③ **Government:** Progressive tax, Social Security, and unemployment insurance
- ④ **Demography:** Age-varying mortality risk and household composition

- **Agents decide each period:**

- ① **Consumption/saving:** how much to consume today vs save for the future?
- ② **Portfolio allocation:** What share of savings to hold in stocks vs one-period bond?
- ③ **Housing:** Rent (flexible quantity) or own (subject to transaction cost)?

## Model: beliefs

- Each individual  $i$  of belief group  $j$  has expectations defined by two components:

$$\text{belief}_{i,j,t} = \gamma_j + \eta_{i,j,t}, \quad \eta_{i,j,t} \sim \mathcal{N}(0, \sigma_j)$$

- Persistent group component:**  $\{\gamma_j^s, \gamma_j^r, \gamma_j^\pi, \gamma_j^h, \gamma_j^w, \gamma_j^m, \gamma_j^{UE}, \gamma_j^{EU}\}$
- Group-specific dispersion:**  $\{\sigma_j^s, \sigma_j^r, \sigma_j^\pi, \sigma_j^h, \sigma_j^w, \sigma_j^m, \sigma_j^{UE}, \sigma_j^{EU}\}$
- Individual specific noise:**  $\{\eta_{j,i,t}^s, \eta_{j,i,t}^r, \eta_{j,i,t}^\pi, \eta_{j,i,t}^h, \eta_{j,i,t}^w, \eta_{j,i,t}^m, \eta_{j,i,t}^{UE}, \eta_{j,i,t}^{EU}\}$
- Group perceived covariances:**  $\{\tilde{\rho}_j^{s,w}, \tilde{\rho}_j^{s,h}, \tilde{\rho}_j^{s,r}\}$

# Bringing the model to the data

- **1. Calibrate the objective economy**

- Income and employment: SIPP
- Mortality: Social Security life tables
- Returns: long-run U.S. averages

- **2. Discipline subjective beliefs with the survey**

- 3 factors  $\times$  3 terciles  $\Rightarrow$  **27 belief types**
- Type moments from survey:  $\{\gamma_j^x, \sigma_j^x, \tilde{\rho}_j\}$
- Baseline: correct population mean; extension: aggregate level bias
- Initial shares: Round 1; dynamics: Round 1  $\rightarrow$  Round 2

- **3. Solve and simulate**

- Common objective data-generating process
- Type-specific beliefs  $\Rightarrow$  **type-specific policy functions**

## Three Results from the Model

**Result 1.** Correlations *attenuate* the pass-through beliefs  $\rightarrow$  actions

# Attenuation puzzle

- **Puzzle:** choices respond less to beliefs than the model predicts (Giglio et al. 2021)

$$\text{Attenuation} = \underbrace{\text{Model-implied response}}_{\text{benchmark}} - \underbrace{\text{Observed response}}_{\text{data}}$$

- **Existing focus:** Why is the **observed response** so small?  
(Enke et al. 2026; Andre et al. 2026)
- **Our focus:** What is the right **model-implied response**?  
⇒ Accounting for correlated beliefs attenuates the benchmark

## Two Counterfactual Belief Calibrations

Isolate role of correlations: two simulations w/ beliefs correct *on average*

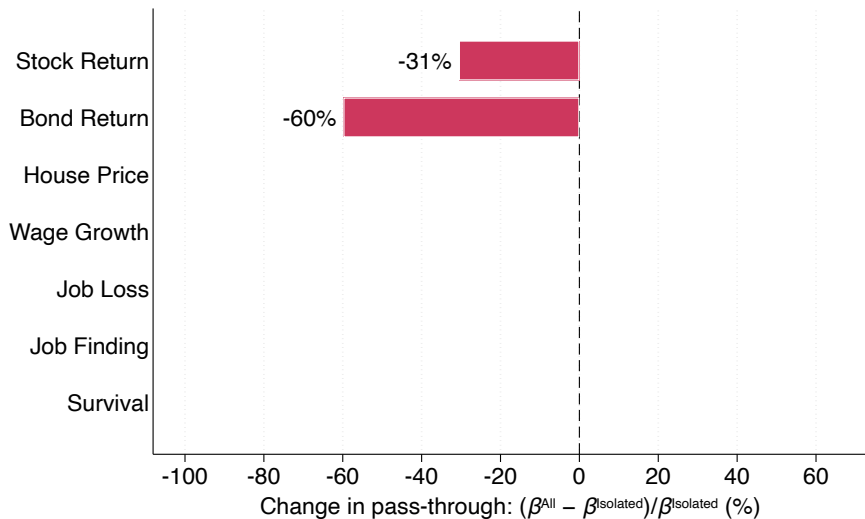
- 1 **Isolated belief.** Heterogeneity in one belief at a time; others held homogeneous.  
⇒ Standard exercise in the literature.
- 2 **Full joint distribution.** All 8 beliefs vary jointly, matching survey's correlations.

Compare regressions of behavior on beliefs across the two calibrations.

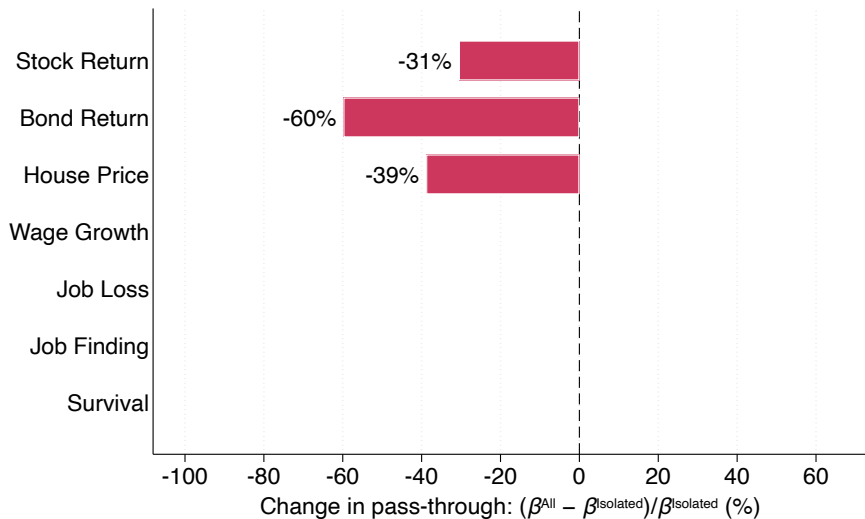
⇒ The difference measures the **omitted-variable bias**  
from studying expectations *one domain at a time*.

$$\underbrace{\tilde{\beta}_1}_{\text{isolated estimate}} = \underbrace{\beta_1}_{\text{true effect}} + \underbrace{\beta_2 \cdot \text{Corr}(x_1, x_2) \cdot \frac{\sigma_{x_2}}{\sigma_{x_1}}}_{\text{omitted-variable bias}}$$

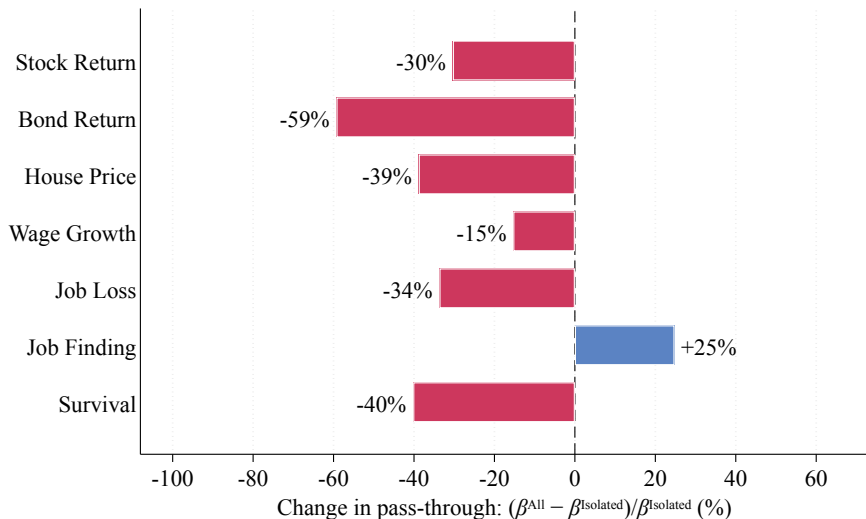
## Result 1. Correlations Attenuate Pass-through to Asset Shares



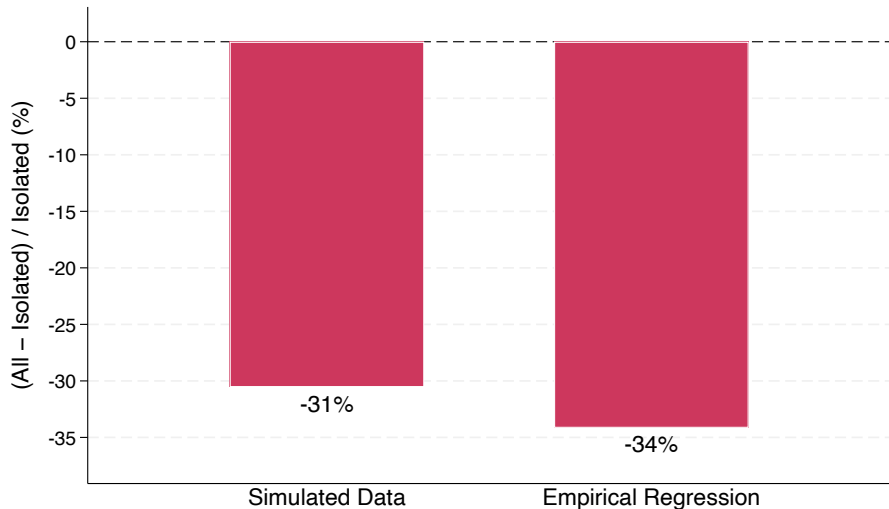
## Result 1. Correlations Attenuate Pass-through to Home Buying



## Result 1. Correlations Attenuate Pass-through to Consumption



## Result 1. Correlations Attenuate Pass-through to Asset Shares



# Three Results from the Model

**Result 1.** Correlations *attenuate* the pass-through beliefs  $\rightarrow$  actions

**Result 2.** Correlations *reduce* the welfare cost of belief heterogeneity

# Two Counterfactual Welfare Calculations

Compute lifetime consumption-equivalent welfare loss under:

① **Independent beliefs.**

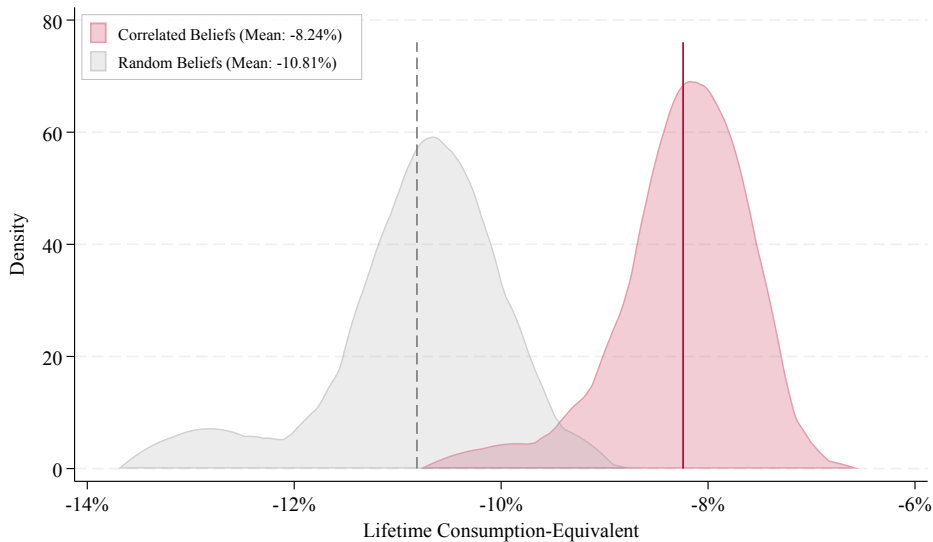
All beliefs vary according to empirical dispersion, but no cross-domain correlations.

② **Full joint distribution.**

Same mean and dispersion, but matching observed correlations.

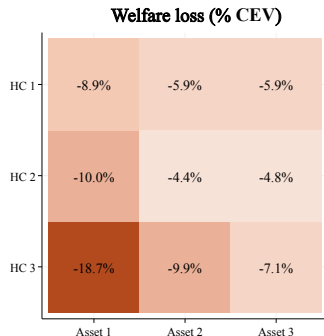
⇒ Difference = welfare effect of **belief correlations**.

## Result 2. Correlations ↓ Welfare Cost of Belief Heterogeneity



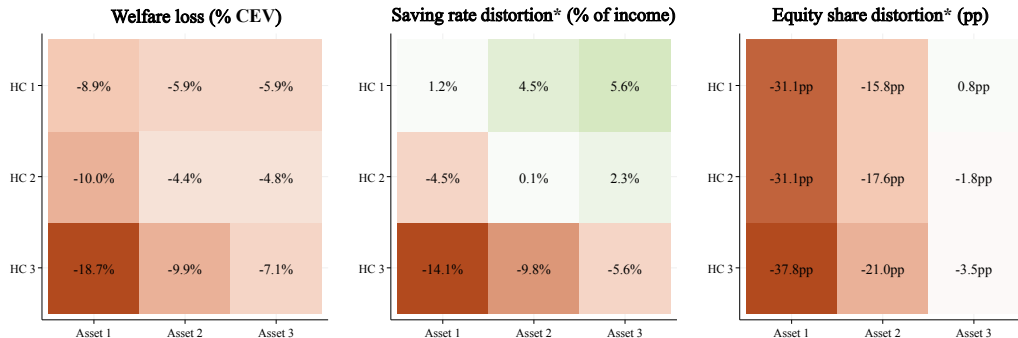
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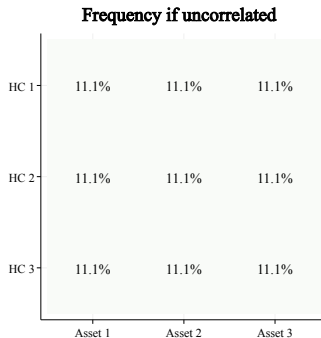
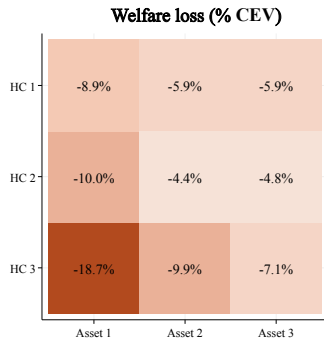


\* Deviations from the correct-belief agent under age 21 to 30.

Level bias

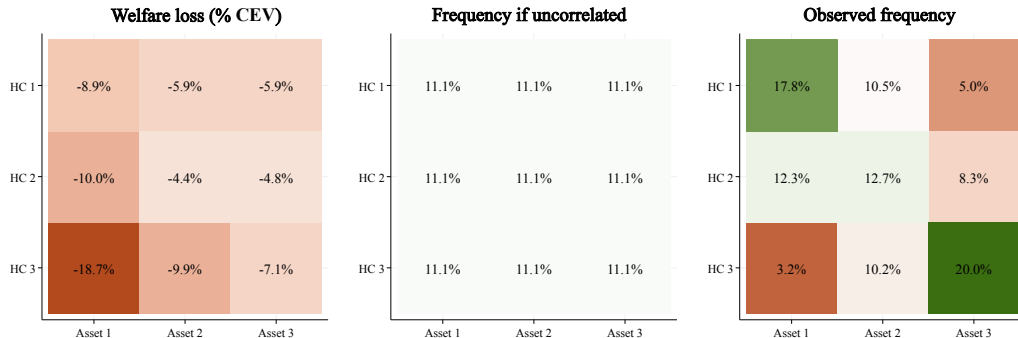
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Alternatives:

All 27 groups

Level bias

In their own words:

Optimist

Pessimist

Higher welfare cost

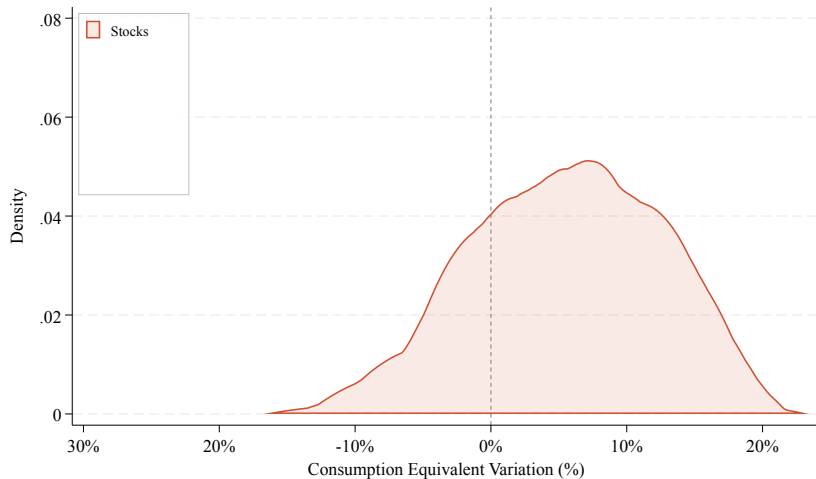
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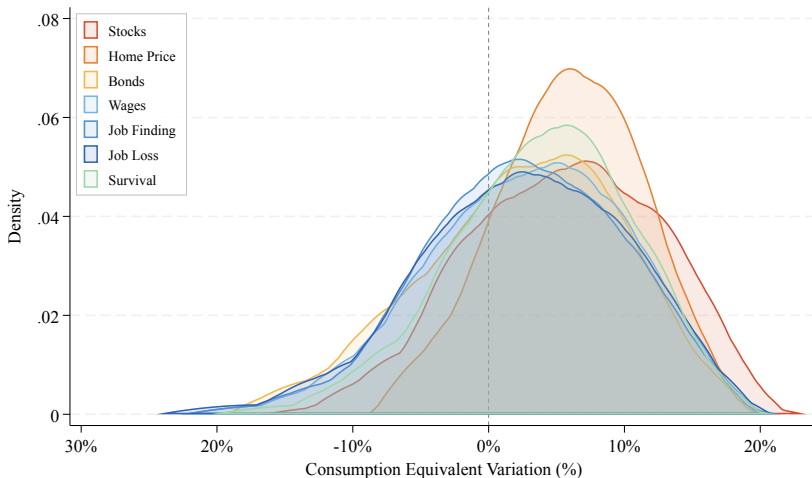
**Result 2.** Correlations *reduce* the welfare cost of belief heterogeneity

**Result 3.** Correcting beliefs *one at a time* can backfire

## Result 3. Correcting Single Beliefs Can Backfire



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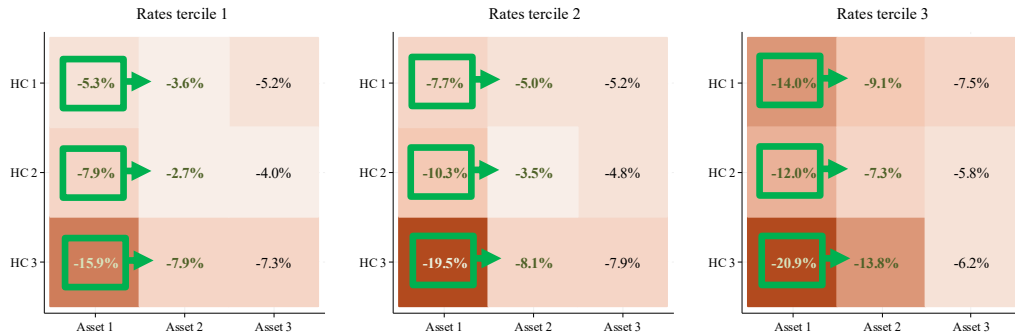


- Roughly 1/4 of belief groups experience a welfare decline

# Whom Should an Asset-Factor Intervention Target?

Correcting those who **under-estimate** the asset factor (bottom tercile) is **generally beneficial**

Welfare loss (% CEV)



In their own words:

Optimist

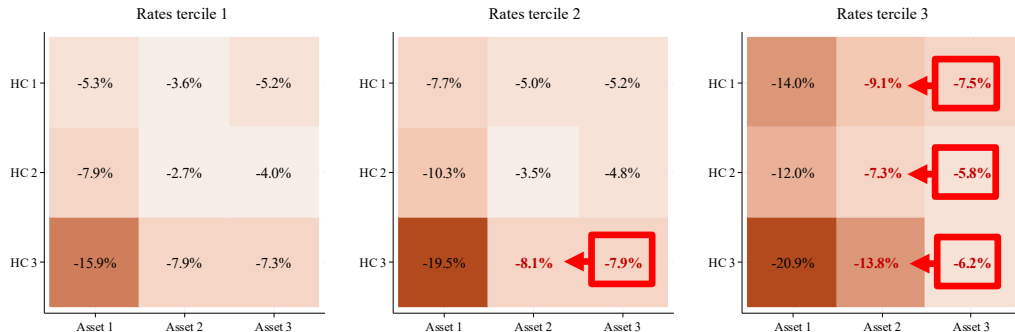
Pessimist

Higher welfare cost

# Whom Should an Asset-Factor Intervention Target?

Correcting those who **over-estimate** the asset factor (top tercile) **often backfires**

Welfare loss (% CEV)



In their own words:

Optimist

Pessimist

Higher welfare cost

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# Conclusion

## Three main results about correlated beliefs:

- **Positive:** ↓ (most) model-implied elasticities of choices to beliefs
- **Normative:** ↓ welfare cost of belief heterogeneity  
→ the most costly belief combinations are rare in the data
- **Policy:** Well-intended intervention can backfire if poorly targeted

**Open question.** Why does the joint distribution of beliefs take this form?

# Sources of Expectations

**Question:** Given correlations protect against belief heterogeneity, where do these expectations come from?

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**Two strategies from the survey:**

- **Open-ended LLM chatbot responses**

- How did you come up with your forecast?
- How do you think economic outcomes are related? (e.g. stocks and home prices)

# Survey: Eliciting Beliefs About Correlations

Now imagine next year turns out to be a {bad/good} year for the stock market and **stocks return {-5 % / % 15}** — about 10 percentage points {less/more} than you expected.

You told us that in a typical year you'd expect **home prices to grow {5 %}**. In a {bad/good} stock year like this one, do you think **home prices would grow faster than usual, slower than usual, or about the same?** Move the slider to show how many percentage points faster or slower. Leave it in the middle if you think they'd grow about as usual.

-20%                      -10%                      0%                      10%                      20%

Percentage points faster or slower



4% slower than usual



## Model: demographics and preferences

- **Life cycle:** enter work at  $a_0$ , work  $T_w$  periods, retire, live at most  $T$ 
  - age-dependent survival  $m_t = \text{prob. of reaching } t+1 \text{ given alive at } t$
- **Preferences:** CRRA with a Cobb-Douglas aggregator over non-durable consumption  $C_t$  and housing services  $H_t$ , equivalence scale  $n_t$

$$U(C_t, H_t) = \frac{n_t \left( \frac{C_t^{1-\nu} H_t^\nu}{n_t} \right)^{1-\gamma}}{1-\gamma}$$

- Discount factor  $\beta$ , risk aversion  $\gamma$ , housing weight  $\nu$

## Model: labor market

Employment status  $emp_t \in \{E, U, Ret\}$ ; retirement is deterministic at  $t = T_w$ .

- **Employed** ( $emp_t = E$ ): deterministic cubic age profile + persistent AR(1)

$$\ln w_t = \delta_0 + \delta_1 a_t + \delta_2 a_t^2 + \delta_3 a_t^3 + \eta_t, \quad \eta_t = \rho \eta_{t-1} + \xi_t^E$$

- **Unemployed** ( $emp_t = U$ ): separate w.p.  $\pi^U(t)$ , collect  $ui(\eta_t)$ 
  - re-employment shock  $\xi_{t+1}^U \sim \mathcal{N}(\mu^{UE}, \sigma_\xi^2)$  with  $\mu^{UE} < 0$  = wage scarring
  - find work next period w.p.  $\pi^E(t)$
- **Retired** ( $emp_t = Ret$ ): public pension  $ss$

## Model: financial assets

- **Risk-free bond:** constant gross return  $R^B = R_f$
- **Risky equity index:** i.i.d. log returns

$$\ln R_t^S = \ln R_f + \mu_s + \varepsilon_t, \quad \varepsilon_t \sim \mathcal{N}(0, \sigma_s^2)$$

- **Housing:** price grows at gross rate  $R^H$ , i.e.  $P_{t+1}^H = R^H P_t^H$
- **True correlations are zero:**

$$\text{Cov}(R_t^S, w_t) = \text{Cov}(R_t^S, R_t^H) = \text{Cov}(R_t^S, R_t^B) = 0$$

⇒ any perceived co-movement is a **pure belief distortion**

## Model: housing tenure

Housing status  $house_t \in \{O, R\}$  each period.

- **Renters** ( $house_t = R$ ): pay annual rent on chosen services  $H_{it}$

$$X_t(H_{it}) = \frac{P_t^H H_{it}}{\chi}, \quad \chi = \text{price-to-rent ratio}$$

- **Owners** ( $house_t = O$ ): buy with down payment  $\phi P_t^H H_{it}$ , then fixed 30y payments:

$$A = \frac{(1 - \phi) P_t^H H_{it}}{\frac{1}{r^M} \left( 1 - (1 + r^M)^{-L^M} \right)}$$

- may sell at  $P_t^H H_{it}$  net of cost  $c_H P_t^H H_{it}$  and remaining principal
  - no mortgage default; agents can always afford to sell
- Beliefs about [home-price growth](#) drive the rent-vs-buy decision

# Model: investor's problem

Value function solved separately for each group  $j$ , taking  $belief_j$  as fixed:

$$V_j(\mathbf{s}_{it}) = \max_{C_{it}, W_{it+1}, \alpha_{it}, house_{t+1}, H_{it+1}} U(C_{it}, H_{it}) + \beta \tilde{m}_{t,j} \mathbb{E}_j[V_j(\mathbf{s}_{it+1}) | \mathbf{s}_{it}, belief_j]$$

**8 state variables  $\mathbf{s}_{it}$ :**

- $a_t$ : age
- $W_{it}$ : liquid wealth
- $\eta_{it}$ : persistent earnings state
- $emp_t$ : employment  $\in \{E, U, Ret\}$
- $house_t$ : tenure  $\in \{O, R\}$
- $H_{it}$ : housing quantity
- $M_{it}$ : mortgage principal
- $j_t$ : belief group

# Model: investor's problem

Value function solved separately for each group  $j$ , taking  $belief_j$  as fixed:

$$V_j(\mathbf{s}_{it}) = \max_{C_{it}, W_{it+1}, \alpha_{it}, house_{t+1}, H_{it+1}} U(C_{it}, H_{it}) + \beta \tilde{m}_{t,j} \mathbb{E}_j[V_j(\mathbf{s}_{it+1}) | \mathbf{s}_{it}, belief_j]$$

## 5 choice variables $\mathbf{Y}_{it}$ :

- $C_{it}$ : non-durable consumption
- $W_{it+1}$ : end-of-period liquid wealth
- $\alpha_{it}$ : equity share  $\in [0, 1]$
- $house_{t+1}$ : tenure  $\in \{\text{stay, buy, sell}\}$
- $H_{it+1}$ : housing quantity (renters / new buyers)

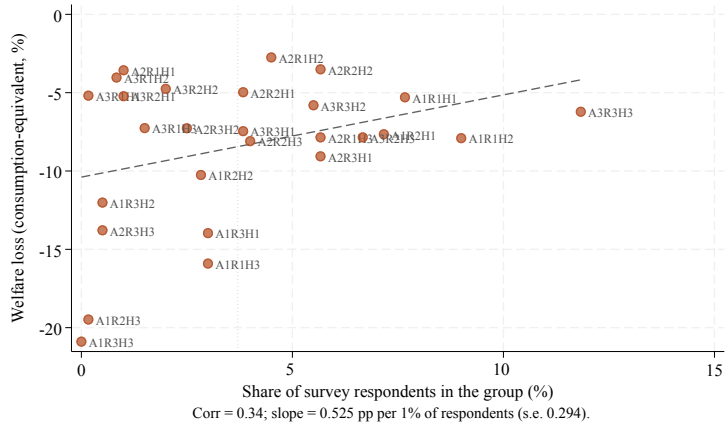
unemployed / retired cases replace  $w_t$  with  $ui(\eta_t)$  or  $ss$

# Stock Share and Expectations: Regression Evidence

|                | % of retirement assets invested in stocks |                                    |
|----------------|-------------------------------------------|------------------------------------|
| Expected. . .  | (1)                                       | (2)                                |
|                | <i>stock returns only</i>                 | <i>all expectations jointly</i>    |
| Stock returns  | <b>0.484<sup>***</sup></b> (0.174)        | <b>0.735<sup>***</sup></b> (0.249) |
| T-bill rate    |                                           | -0.636 <sup>***</sup> (0.214)      |
| Housing return |                                           | 0.061 (0.147)                      |
| Wage growth    |                                           | -0.241 (0.175)                     |
| P(live to 75)  |                                           | 0.149 <sup>***</sup> (0.031)       |
| P(lose job)    |                                           | -0.036 (0.032)                     |
| P(find job)    |                                           | 0.025 (0.027)                      |
| Controls       | Yes                                       | Yes                                |
| Observations   | 1,977                                     | 1,977                              |
| $R^2$          | 0.09                                      | 0.10                               |

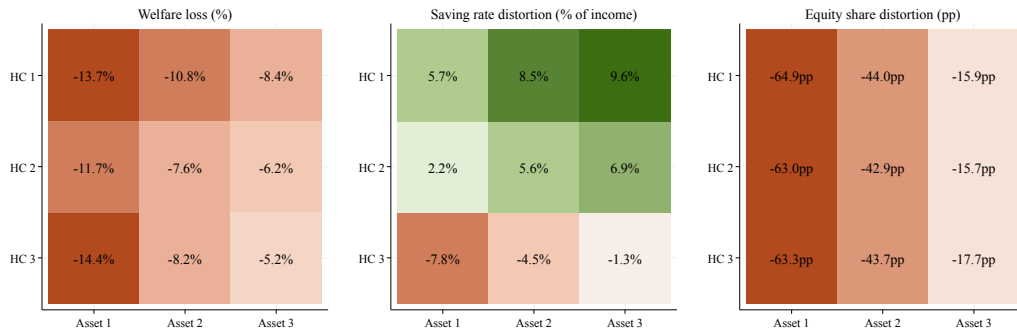
Full sample, both waves. Standard errors in parentheses. \*\*\*  $p < 0.01$ .

# Mechanism: Cost vs. Frequency Across All 27 Belief Groups



# Level Bias: Which Belief Types Are **Costly**?

**Different exercise:** belief type *fixed* over the life cycle (no transitions), to isolate the mechanism



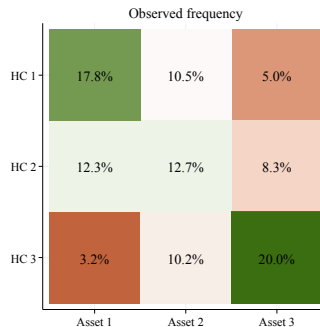
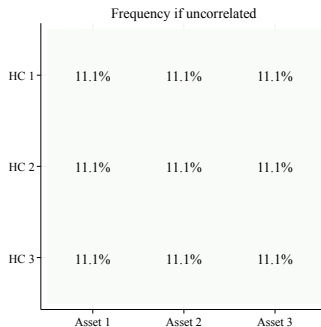
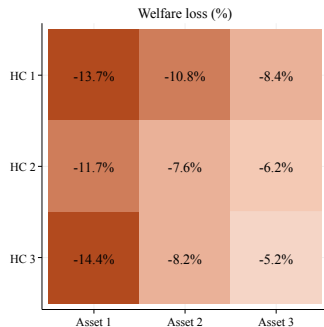
Distortions are deviations from the correct-belief agent, ages 21 to 29. Rates factor averaged out.

[Benchmark values](#)

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# Level Bias: Which Belief Types Are Common?

**Different exercise:** belief type *fixed* over the life cycle (no transitions), to isolate the mechanism



Benchmark values

◀ Back

# Level Bias: The Objective Benchmark

**Level bias** = respondent's expectation – the objective value below  
(the baseline instead normalizes the *population-average* belief to the truth).

| Expectation   | Objective value | Source                                                              |
|---------------|-----------------|---------------------------------------------------------------------|
| Stock returns | 14.66%          | 10-yr average S&P 500 nominal annual return (Shiller)               |
| Home prices   | 6.92%           | 10-yr average national nominal HPI growth (FRED)                    |
| T-bill rate   | 2.32%           | 10-yr average nominal return on the 1-year T-bill (FRED)            |
| Wage growth   | 4.17%           | 10-yr average annual wage growth (Atlanta Fed)                      |
| Inflation     | 3.18%           | 10-yr average annual inflation (Shiller CPI)                        |
| P(lose job)   | 10.48%          | 10-yr average annual job-loss share (LEHD J2J)                      |
| P(find job)   | 48.49%          | 10-yr average annual job-finding share of the unemployed (LEHD J2J) |
| P(live to 75) | 75.19%          | SSA 2025 life tables, by age and gender (sample average)            |

Survival is person-specific (age  $\times$  gender); 75.19% is the sample average.

# Static Portfolio Choice Decisions

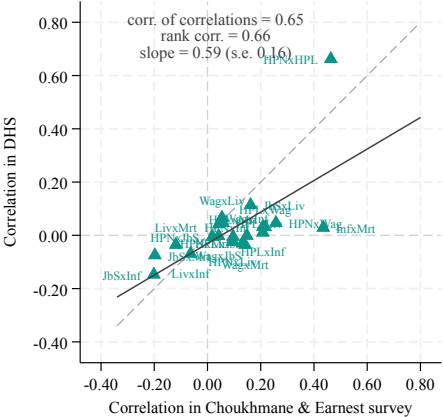
- **Static mean-variance portfolio allocation:** two risky + one risk-free asset

$$\tilde{w}_1 - w_1^* = (\gamma \det(\Sigma)) [\sigma_2^2 (\mu_1 \epsilon_1 - r \epsilon_r) - \sigma_{12} (\mu_2 \epsilon_2 - r \epsilon_r)]$$

- **Agents hold biased beliefs** about expected returns

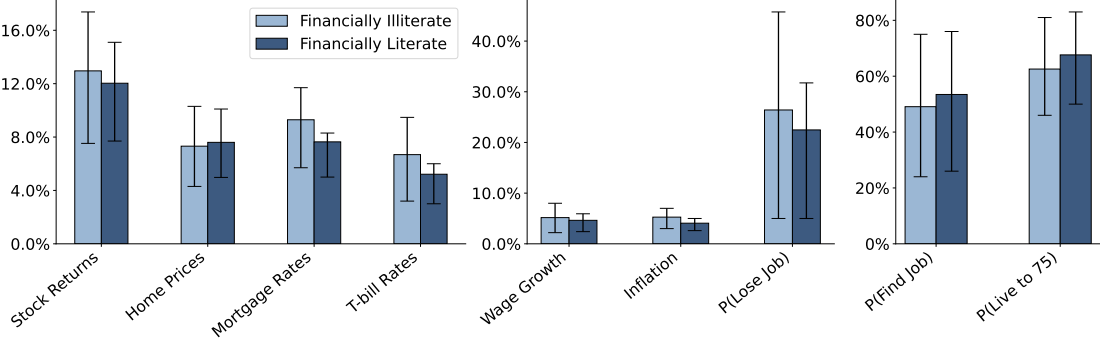
| Asset 1                                  | Asset 2                                  | Risk-free rate                   |
|------------------------------------------|------------------------------------------|----------------------------------|
| $\tilde{\mu}_1 = (1 + \epsilon_1) \mu_1$ | $\tilde{\mu}_2 = (1 + \epsilon_2) \mu_2$ | $\tilde{r} = (1 + \epsilon_r) r$ |

# External Validation: Dutch Household Survey



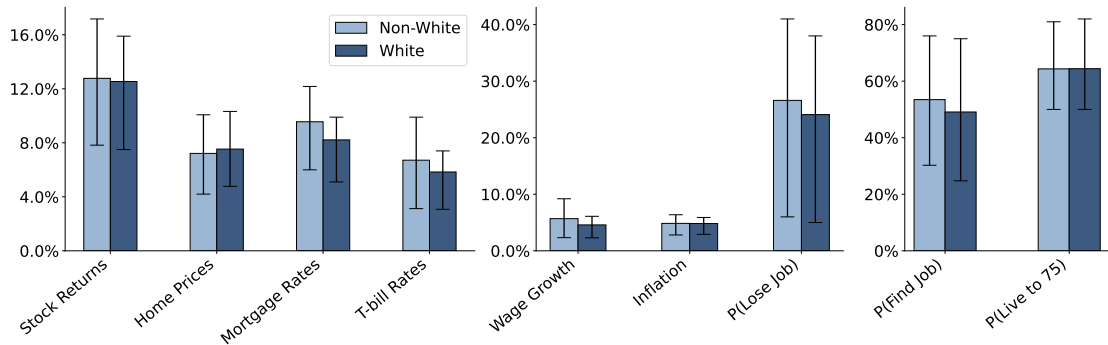
One point per belief-domain pair elicited comparably in both surveys (21 pairs)

# Expectations by Financial Literacy



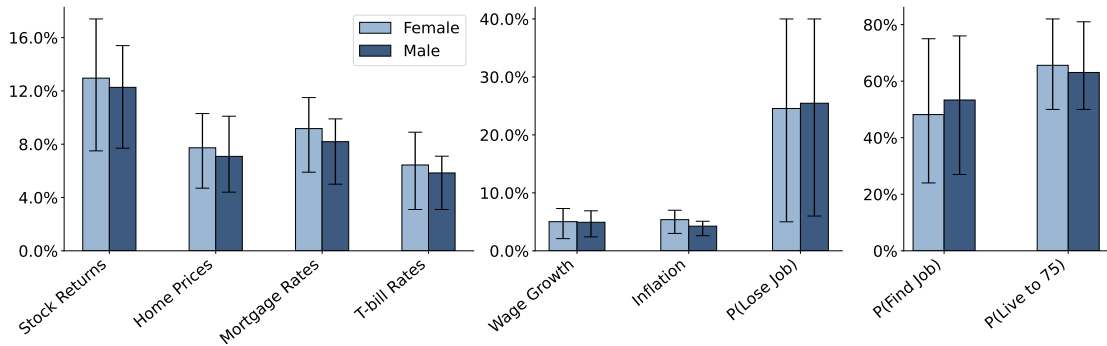
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# Expectations by Race



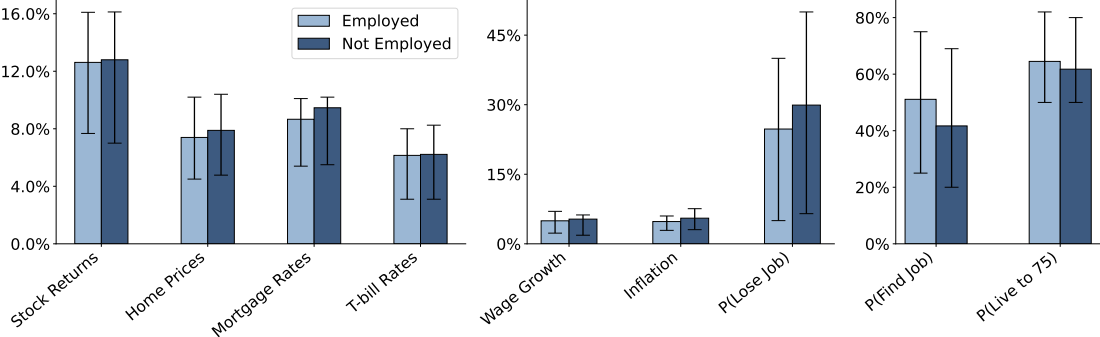
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# Expectations by Gender



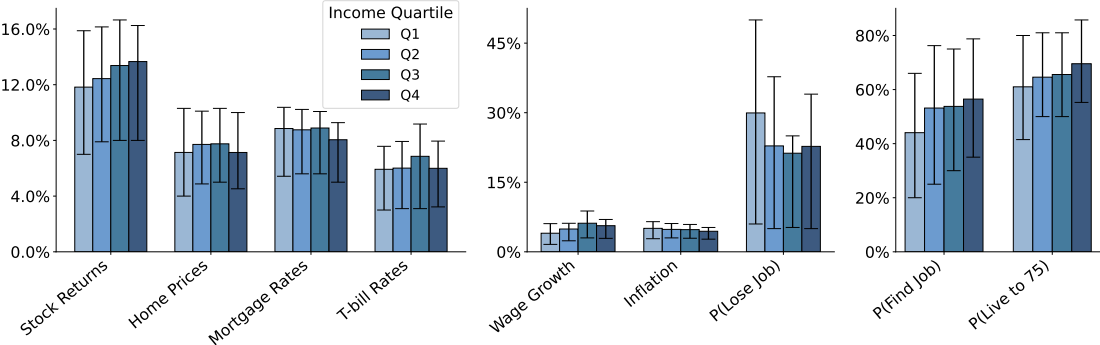
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# Expectations by Employment Status



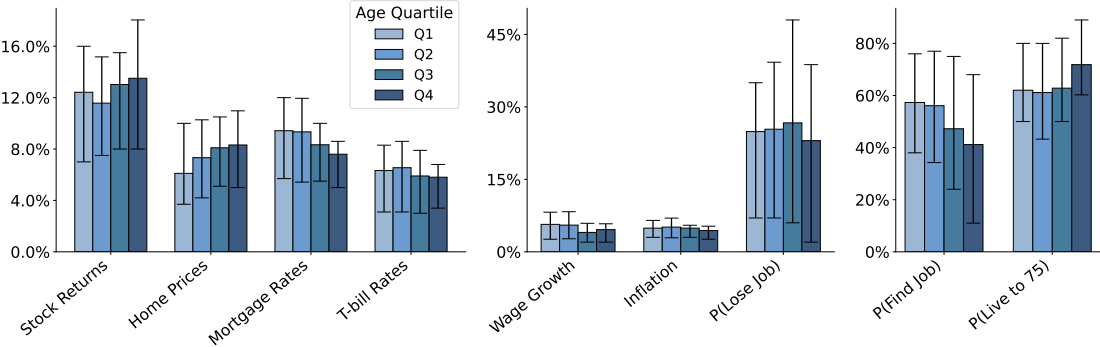
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# Expectations by Income



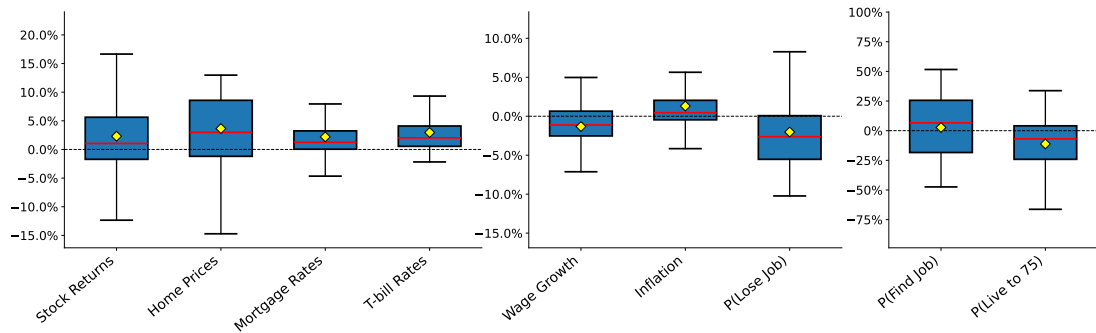
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# Expectations by Age



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# Average Bias



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# Survey: Memory Mortgage Rates

Over the **past 10 years**, what do you think the **average 30-year fixed mortgage interest rate** was in the U.S.?

0%

5%

10%

15%

20%

10 year avg.



Back

# Survey: Typical Life Expectancy

Among individuals of your same age and sex, what do you think is the **percent chance (from 0% to 100%) of living to age 75 or older?**

0%

20%

40%

60%

80%

100%

Probability



Back

## Survey: Memory Inflation

Over the **past 10 years**, what do you think **the average annual inflation rate** was? (the percent change in the prices of goods and services over a year)

-10%

-5%

0%

5%

10%

15%

10 year avg.



Back

# Survey: Typical Job Finding

In the U.S. over the **past 10 years**, what do you think the **average percentage of unemployed individuals who found a new job** within one year of being laid off or fired was?

0%

25%

50%

75%

100%

10 year avg.



Back

## Survey: Typical Job Loss

In the U.S. over the **past 10 years**, what do you think the **average probability that an employed individual was laid off or fired** was in a typical year?

0%

5%

10%

15%

20%

10 year avg.



Back

## Survey: Typical Wages

Over the **past 10 years**, what do you think has been the **average annual percentage change in the wage** of a typical worker in the U.S.?

-10%

-5%

0%

5%

10%

10 year avg.



Back

# Survey: Memory T-bill

Over the **past 10 years**, what do you think the **average annual return on a 1-year Treasury bill** was in the U.S.?

(a 1-year Treasury bill is a short-term U.S. government bond with virtually no default risk)

0%

5%

10%

15%

20%

10 year avg.



Back

# Survey: Memory Home Prices

Over the **past 10 years**, what do you think the **average annual percentage change in U.S. home prices** was?"

-20%

-10%

0%

10%

20%

10 year avg. annual change



Back

# Survey: Memory Stocks

Over the **past 10 years**, what do you think the **average annual return was for an investment in the S&P 500** stock market index?

(the S&P 500 tracks the performance of 500 of the largest publicly traded companies in the U.S.)

-50%                      -25%                      0%                      25%                      50%

10 year avg. annual return



Back

# Survey: Psychological Measures

On a scale from 1 (Strongly Disagree) to 5 (Strongly Agree), how much do you agree with the following statements?

Strongly Disagree                      Neutral                      Strongly Agree  
1                      2                      3                      4                      5

In uncertain times, I usually expect the best.

I always look on the bright side of things.

I'm always optimistic about my future.



Back

# Survey: Attention Checks

## Attention Check

You will flip a fair coin 10 times. You earn **\$1 for each time it lands on tails**.

- The **minimum** you can earn is **\$0** (if all flips are heads).
- The **maximum** is **\$10** (if all flips are tails).
- The **most likely** amount is **\$5** (since there's a 50% chance of tails).

Use the sliders below to indicate the:

- Minimum possible earnings
- Maximum possible earnings
- Most likely earnings

\$0                      \$2                      \$4                      \$6                      \$8                      \$10

Minimum possible earnings



Maximum possible earnings



Most likely earnings



Back

# Survey: Job Finding Expectations

Thinking about the **remainder of your career**, imagine you lose your job at some point. What do you think is the **percent chance (from 0% to 100%) that you would find a new job** with about the same pay within one year of losing your job?

0% 25% 50% 75% 100%

Probability



Back

# Survey: Job Loss Expectations

Thinking about the **remainder of your career**, what do you expect is the **percent chance (from 0% to 100%) you lose your job** in a given year due to being laid off or fired?

0%

25%

50%

75%

100%

Probability



Back

# Survey: Wage Growth Expectations

For the **remainder of your career** what do you expect your **average annual percent change in wages** will be? (Please consider your total wage changes from year to year, whether increases from raises or promotions, or decreases from cuts.)

-25%                      -15%                      -5%                      5%                      15%                      25%

Avg. percent change



Back

# Survey: Life Expectancy

What do you believe is the **percent chance (from 0% to 100%)** you live to age 75 or older?

0%

20%

40%

60%

80%

100%

Probability



Back

# Survey: Inflation Expectations

Over the next **20 years**, what do you believe the **average U.S annual inflation rate** will be? (i.e., the percent change in the prices of goods and services over a year)?

-10%                      -5%                      0%                      5%                      10%                      15%

Avg. annual rate



Back

# Survey: T-bill Expectations

Over the next **20 years**, what do you believe the **average annual return on a 1-year Treasury bill** will be in the U.S.? (a 1-year Treasury bill is a short-term U.S. government bond with virtually no default risk)

0%                      5%                      10%                      15%                      20%                      25%

Avg. annual return



Back

# Survey: Mortgage Rate Expectations

Over the next **20 years**, what do you believe the **average 30-year fixed mortgage interest rate** will be in the U.S.?

0%                      5%                      10%                      15%                      20%                      25%

Avg. Rate



Back

# Survey: Housing Expectations

Imagine as a long term investment you invest in a **U.S. housing market index fund** (a fund that simply follows the entire U.S. housing market). If you held that fund for the next **20 years**, what **average annual return** would you expect?

-20%                      -10%                      0%                      10%                      20%

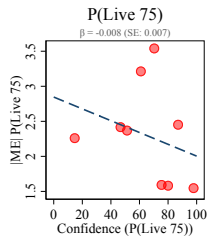
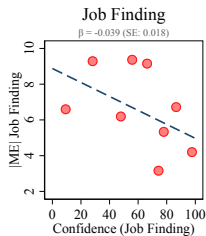
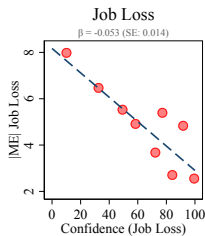
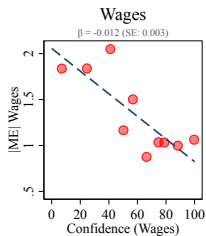
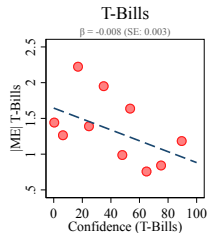
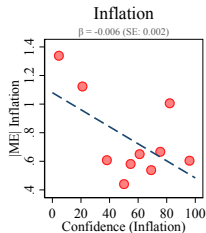
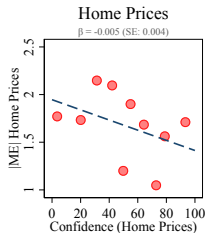
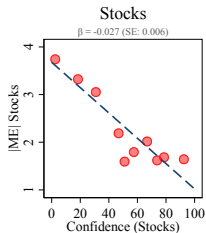
Avg. annual return



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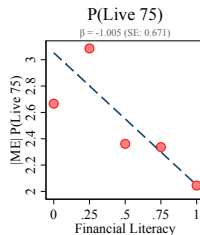
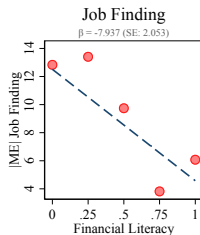
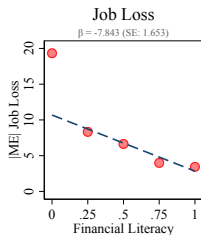
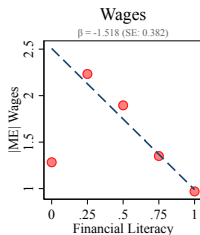
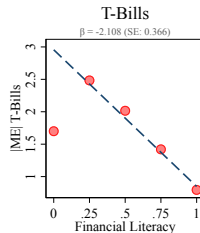
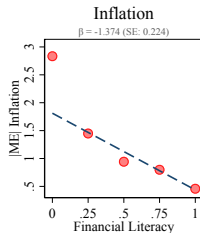
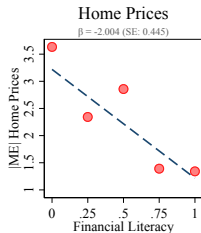
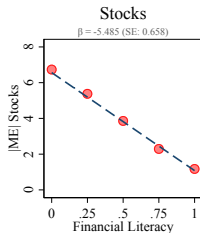
# Measurement Error and Confidence

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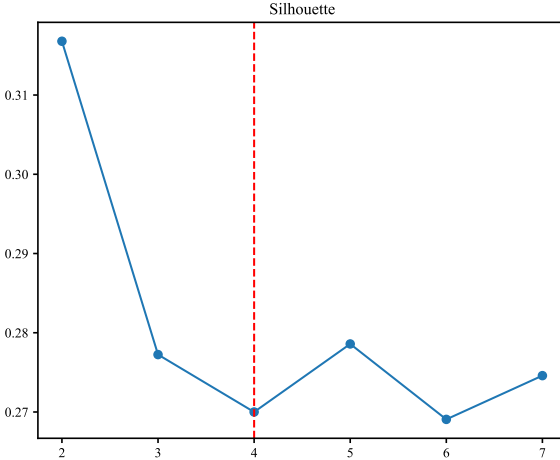
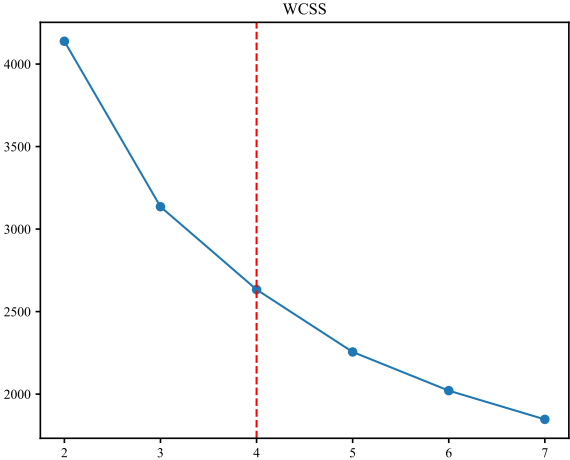


# Measurement Error and Financial Literacy

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# Cluster Scores



# Dispositional optimism: survey questions

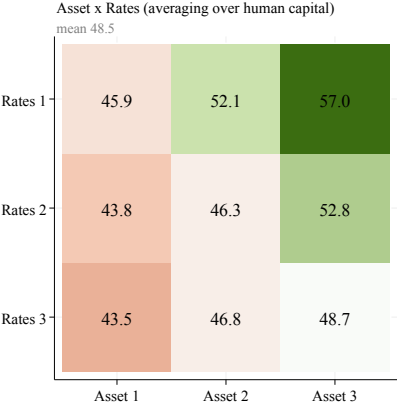
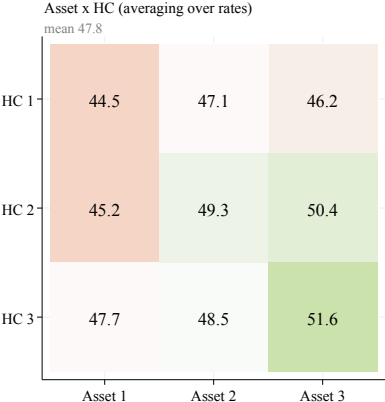
Q121 On a scale from 1 (Strongly Disagree) to 5 (Strongly Agree), how much do you agree with the following statements?

|                                                   | Strongly Disagree                                                                  |   | Neutral |   | Strongly Agree |
|---------------------------------------------------|------------------------------------------------------------------------------------|---|---------|---|----------------|
|                                                   | 1                                                                                  | 2 | 3       | 4 | 5              |
| In uncertain times, I usually expect the best. () |  |   |         |   |                |
| I always look on the bright side of things. ()    |  |   |         |   |                |
| I'm always optimistic about my future. ()         |  |   |         |   |                |

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# Belief types and age

Mean age by belief group (years; overall 48.0)



# Belief types and income

Mean income by belief group (\$ thousands; overall 61.2k)

