Long-term Beliefs and Financial Choices

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Rick Sias, Laura Starks, & Harry Turtle

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Background

- Most theory: $E(R_{k\text{-years}})=k \times E(R_{1\text{-year}})$
- Most evidence: $E(R_{1\text{-year}})$

- Our study: Consider both near-term (1-year horizon) and long-term (10-year horizon) return distribution perceptions

Individuals' beliefs are puzzling (evidence based on 1-year horizon)

- Lots of persistent heterogeneity
- Subjective return beliefs differ from objective expected returns
- Beliefs related to participation, risky share, trading decisions
  - BUT – Relations are much weaker than theory suggests (attenuation puzzle)
  - E.g., Empirical beliefs-risky share relation ~ 10% of theoretical beliefs-risky share relation

Should long-term beliefs matter?

- Absent frictions, maybe not
  - Can adjust based on NT beliefs
    - E.g., bullish NT, bearish LT➔Hold equity now, sell later

- But maybe so:
  - Reported E(R) = True E(R) + noise
  - With frictions and a long-horizon, LT E(R) may matter
  - If individuals are uncertain about their NT beliefs (cognitive uncertainty) will put some weight on LT beliefs

Data

- RAND American Life Panel (ALP)

- 3,800+ individuals in 61 interviews over 87-month period (2008-2016)
  - Stock market participation in 30 waves
  - Risky share in six waves

- ~90K panel observations (average person participates in 23 interviews)

The six return belief questions

- Short-term beliefs
  - Chance markets increase in next year?
  - Chance increase >20% in next year?
  - Chance decrease >20% in next year?
- Long-term beliefs
  - Chance increase in next 10-years?
  - Chance increase >20% in 10-years? (29 long-form waves)
  - Chance decrease >20% in 10-years? (29 long-form waves)

- Infer $E(r_{i,1\text{-year}})$ and $E(r_{i,10\text{-year}})$ from $P(r>0.2)$ and $P(r<-0.2)$

- Focus on inferred expected return but also look at raw data (and reach same conclusions)

Basic model (~Patton and Timmermann (2010))

- E(r) = prior + signal
- $E_{i,t}(r_1) = \mu_i + \eta_{i,t,1}$
- $E_{i,t}(r_{10}) = 10\mu_i + \eta_{i,t,1} + \eta_{i,t,2} \ldots + \eta_{i,t,10}$

➔Key implication: Signals play a larger role in heterogeneity in 1-year beliefs than 10-year beliefs

➔Five empirical implications

Test 1: XS variation in expectations

- If signals play no role,

  $E(r_{10})=10E(r_1)$ ➔ $\sigma_{xs}(E(r_{10}))/\sigma_{xs}(E(r_1)) = 10$

- If signals play a role,

  $\sigma_{xs}(E(r_{10}))/\sigma_{xs}(E(r_1)) < 10$

- Empirically: $\sigma_{xs}(E(r_{10}))/\sigma_{xs}(E(r_1)) = 2.72$

➔Temporary signals play a role in explaining heterogeneity in beliefs

Test 2: Characteristics will better explain LT expectations

- Regress ST and LT on characteristic x

$$\beta_{1\,year} = \frac{cov(\mu_i, x_i) + cov(\eta_{1,i}, x_i)}{\sigma_{xs}(x_i)}$$

$$\beta_{10\,year} = \frac{10cov(\mu_i, x_i) + cov(\eta_{1,i}, x_i) + \cdots + cov(\eta_{10,i}, x_i)}{\sigma_{xs}(x_i)}$$

➔ Characteristics better explain LT belief heterogeneity

Test 2: Characteristics will better explain LT expectations (standardized)

	$E(r_{1\text{-year}})$	$E(r_{10\text{-year}})$	Difference
Income	0.016	**0.118**	**0.103**
Education	**0.081**	**0.148**	**0.067**
Age	0.008	0.001	-0.007
Health	**0.044**	**0.043**	-0.001
Female	0.045	**-0.281**	**-0.326**
Married	-0.033	**-0.076**	-0.043
White	-0.029	**0.124**	**0.153**
Retired	**0.112**	**0.150**	0.038
Working	0.014	-0.024	-0.038
R^2	1.8%	11.1%	5.6%

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Test 3: Risky share, NT expectations, and LT expectations

- If individuals are uncertain about their NT beliefs, then LT beliefs may matter (also frictions, noise in reported values)

- Baseline test: Regress %equity on 1- and 10-year expected returns
  - $E(r_x)$ are standardized

Test 3: Risky share, NT expectations, and LT expectations

	(1)	(2)	(3)
$E(r_{1\text{-year}})$	2.686 (3.90)		0.674 (0.98)
$E(r_{10\text{-year}})$		6.964 (10.34)	6.762 (9.74)
P(equal)			0.01
R^2	5.3%	9.1%	9.1%

1. ↑NT expected returns➔ ↑ risky share

2. LT expectations much more (10X) important than NT expectations

3. Coefficient on LT expectations much closer to theoretical value
   - NT is ~8% of theoretical value
   - LT is ~67% of theoretical value

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Test 4: Participation, NT expectations, and LT expectations

- Baseline test: Regress stock market participation on 1- and 10-year expected returns
  - $E(r_x)$ are standardized

Test 4: Participation, NT expectations, and LT expectations

	(1)	(2)	(3)
$E(r_{1\text{-year}})$	0.055 (8.96)		0.022 (3.82)
$E(r_{10\text{-year}})$		0.115 (18.90)	0.109 (18.25)
P(equal)			0.01
$R^{2.}$	2.5%	6.6%	6.8%

1. ↑NT expected returns➔ ↑ SMP

2. LT expectations much more (5X) important than NT expectations

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Test 5: Trading, NT expectations, and LT expectations

- Previous work –
  - Weak relation between beliefs and actions
  - Inertia
- Examine 27 trading windows (~90 days each)
  - Do they trade? (In retirement? In direct?)
  - Do they report changes in expectations?

Test 5: Trading, NT expectations, and LT expectations

	No trade	Buy	Sell	$\Delta E(r_{1\text{-year}})$	$\Delta E(r_{10\text{-year}})$
Retirement	85%	10%	5%	91%	89%
Direct	73%	17%	9%	92%	92%

- Most don't trade
  ➔inertia

- Reported expected returns change almost always

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Test 5: Multinomial logit of trading on E(r) and ΔE(R)

	Buy	Sell	Buy	Sell
	Retirement accounts		Direct accounts	
(A)$E(r_{1\text{-year}})_{-1}$	-0.003	**-0.013**	-0.020	0.006
(B) $E(r_{10\text{-year}})_{-1}$	**0.017**	**0.011**	**0.029**	**0.015**
(C) $\Delta E(r_{1\text{-year}})$	-0.001	**-0.009**	-0.004	0.000
(D) $\Delta E(r_{10\text{-year}})$	**0.008**	**0.007**	0.012	0.007
p(A=B)	**0.01**	**0.01**	**0.01**	0.19
P(C=D)	0.10	**0.01**	0.12	0.31

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1. LT expectations appear more important than NT expectations

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2. Buying associated with higher LT E(R) and increases in LT E(R)

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3. Selling appears to be associated with more bullish LT and bearish NT, i.e., difference matters

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4. Stronger for retirement accounts than direct trading

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Summing up

- Evidence that temporary signals play a role in beliefs (especially 1-year beliefs)
  - (Scaled) cross-sectional variation in 10-year beliefs<1-year beliefs
  - Characteristics better explain 10-year beliefs (relative to 1-year beliefs)
- LT expectations are much more important (than NT) in explaining heterogeneity in:
  - Risky share
  - Equity market participation
- Expectations change constantly, but little trading
  - LT expectations, however, tend to be more important in explaining trading

Summing up

- Stronger relation between financial choices and LT expectations than NT expectations
  - ➔ Can help explain attenuation puzzle
  - ➔ Role of beliefs in explaining behaviors in other contexts may be underestimated, e.g., why depression babies avoid equities
- Provides guidance for theory
  - Models of investor behavior (which typically assume horizon independence in beliefs)
  - Dispersion of beliefs models (models with dispersion in priors, models with dispersion in signals, and models with both dispersion in priors and signals)

Summing up

- Provides empirical support that cognitive uncertainty can help explain investor behavior
- Has normative implications (e.g., encouraging SMP via education regarding long-horizon returns)


Thank You

Theoretical coefficient

- Let $\gamma=6$; $\sigma(r_1)=20\%$
- %equity = $[E(r_1) - r_f]/\gamma\sigma^2(r_1)$
- %equity = $[1/\gamma\sigma^2(r_1)]\times[E(r_1) - r_f]$
- %equity = $1/(6\times0.2^2) = 4.2$

- %equity = $[E(r_{10}) - r_f]/\gamma\sigma^2(r_{10})$
- %equity = $[1/\gamma\sigma^2(r_{10})]\times[E(r_1) - r_f]$
- %equity = $1/(6\times10\times0.2^2) = 0.42$