Distorted Unemployment Beliefs and Stock Market Participation

Frederik Horn

University of Mannheim

August 28, 2023

Motivation

▶ Important puzzle: Households hold very little stocks around the world.

▶ **Theory:** Traditional models have difficulties in explaining this fact.

▶ **Empirics:** 64.8% of respondents consider labor income risk important in their decision how/whether to allocate funds to the stock market (Choi & Robertson, 2020)

An Empirical Fact
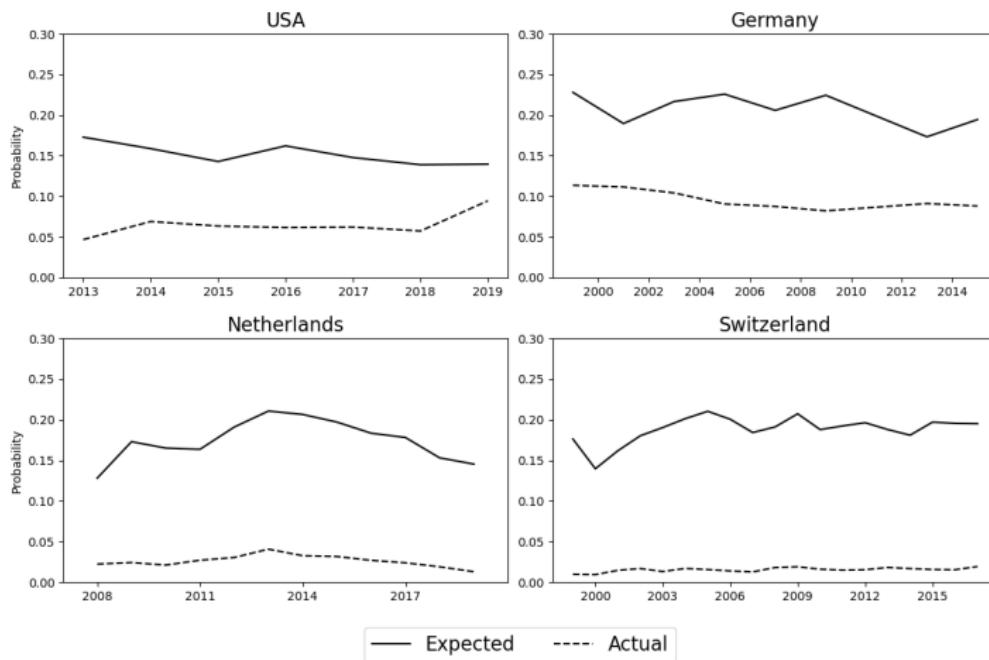
What I find

▶ I find that individuals strongly overestimate the likelihood of losing their job.

▶ Empirically, increases in subjective unemployment expectations decrease the risky share.

▶ Incorporating distorted beliefs in a life-cycle model helps to match the evolution of wealth, equity share and participation rates with more plausible risk aversion estimates.

Motivation
ooo

Unemployment Beliefs
●oo

Model
ooooo

Structural Estimation
oooo

Conclusion
o

Average Unemployment Beliefs

	USA		Germany		Netherlands		Switzerland	
	Exp.	Actual	Exp.	Actual	Exp.	Actual	Exp.	Actual
Total	0.155	0.067	0.195	0.098	0.176	0.026	0.189	0.015
Male	0.153	0.056	0.192	0.108	0.167	0.025	0.189	0.013
Female	0.156	0.080	0.198	0.087	0.186	0.027	0.189	0.019
< 35	0.136	0.078	0.235	0.165	0.158	0.030	0.189	0.028
35-50	0.152	0.061	0.193	0.105	0.180	0.024	0.202	0.014
> 50	0.173	0.067	0.157	0.055	0.182	0.025	0.173	0.009
No Degree	0.165	0.080	0.210	0.097	0.196	0.030	0.173	0.018
Voc. Training	0.155	0.092	0.202	0.100	0.187	0.028	0.199	0.016
University	0.149	0.055	0.173	0.089	0.155	0.021	0.186	0.014
Lowest Income	0.207	0.117	0.230	0.208	0.195	0.025	0.182	0.034
2	0.165	0.069	0.245	0.180	0.221	0.042	0.206	0.032
3	0.138	0.056	0.204	0.117	0.224	0.034	0.205	0.021
4	0.132	0.035	0.170	0.081	0.191	0.032	0.190	0.013
Highest Income	0.136	0.037	0.125	0.056	0.152	0.019	0.166	0.007

Descriptives   Distribution

4

Unemployment Expectations and Actual Unemployment

	USA	Germany		Switzerland		Netherlands	
	Actual	Actual	Actual	Actual	Actual	Actual	Actual
Unemployment	0.049***	0.080***	0.061***	0.015***	0.015***	0.041***	0.033***
Expectation	(12.14)	(54.93)	(29.75)	(17.67)	(14.05)	(19.42)	(13.89)
Person FE	NO	NO	YES	NO	YES	NO	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Observations	8,867	87,301	73,980	72,181	69,577	26,182	24,312
Adjusted R^2	0.044	0.065	0.220	0.020	0.101	0.062	0.198

Motivation
000

Unemployment Beliefs
000●

Model
00000

Structural Estimation
0000

Conclusion
0

Unemployment Expectations and the Risky Share

	Risky Share	Risky Share	Cond. Risky Share	Cond. Risky Share	Parti- cipation	Parti- cipation
Unemployment Expectation(t-1)	-0.006** (-2.10)	-0.006*** (-2.79)	-0.014** (-2.02)	-0.008* (-1.66)	-0.008 (-1.20)	-0.004 (-0.53)
Actual Unemployment	-0.005 (-0.33)	0.004 (0.34)	-0.060 (-1.39)	-0.024 (-0.73)	-0.040 (-1.04)	-0.020 (-0.50)
Person FE	NO	YES	NO	YES	NO	YES
Observations	6,888	5,997	1,748	1,324	4,235	3,164
Adjusted R^2	0.000	0.728	0.004	0.781	0.000	0.672

6

Model

Agent optimizes lifetime utility:

$$E \sum_{t=1}^{T} \delta^{t-1} (\prod_{j=0}^{t-1} p_j) \{ \frac{C_{it}^{1-\gamma}}{1-\gamma} \}$$

Each period she decides how much to:

- consume (C_{it})
- invest in risk-free asset ($1 - \alpha_{it}$)
- invest in risky asset (α_{it})

Model

Labor income process:

$$log(Y_{it}) = f_{it} + \nu_{it} + \epsilon_{it}$$

1. Deterministic component:

$$f_{it} = \overline{f_t} + \alpha_i$$

2. Persistent component:

$$\nu_{it} = \nu_{i,t-1} + \zeta_{it}$$

where $\zeta_{it} \sim \mathcal{N}(0, \sigma_\zeta^2)$ and $\epsilon_{it} \sim \mathcal{N}(0, \sigma_\epsilon^2)$

Motivation
000

Unemployment Beliefs
000

Model
00●00

Structural Estimation
0000

Conclusion
0

Model

Unemployment:

$$log(Y_{it+1}) = \begin{cases} log(Y_{it+1})\kappa & \text{with probability } \omega_{t+1} \\ log(Y_{it+1}) & \text{with probability } (1 - \omega_{t+1}) \end{cases}$$

Subjective unemployment beliefs:

$$E_t^{subj}[log(Y_{it+1})] = \begin{cases} log(Y_{it+1})\kappa & \text{with probability } \omega_{t+1}^{subj.} \\ log(Y_{it+1}) & \text{with probability } (1 - \omega_{t+1}^{subj.}) \end{cases}$$

where $\omega_{t+1}^{subj.} \gg \omega_{t+1}$

9

Motivation
ooo

Unemployment Beliefs
ooo

Model
ooo●o

Structural Estimation
oooo

Conclusion
o

Model

Bellman equation:

$$V_{it}(X_{it}) = \max_{C_{it} \geq 0, 0 \leq \alpha_{it} \leq 1} [U(C_{it}) + \delta p_t E_t V_{i,t+1}(X_{i,t+1})] \ \text{ for } t < T,$$

where:

$$X_{i,t+1} = Y_{i,t+1} + (X_{it} - C_{it})(\alpha_{it} R_{t+1} + (1 - \alpha_{it}) R_f) - 1^{\alpha_{it} > 0} \Phi$$

10

Frederik Horn

University of Mannheim

Preset Parameters

Parameter		Value	Source
Agent:			
Age of first employment	t_0	23	
Age of retirement	t_R	65	
Maximum age	T	100	
Assets:			
Average return risky asset	μ_s	0.082	S&P500 historical returns
Standard deviation risky asset	σ_s	0.159	S&P500 historical returns
Proportional management fee		0.01	Catherine (2021)
Return on risk-free asset	R_f	1.02	Catherine (2021)
Income Process:			
Effect of *age* on log wage	f_1	0.115	PSID
Effect of $age^2/10$ on log wage	f_2	-0.020	PSID
Effect og $age^3/100$ on log wage	f_3	0.001	PSID
Constant	f_0	-1.620	PSID
Std. of transitory income shocks	σ_ϵ	0.290	PSID
Std. of permanent income shocks	σ_ζ	0.117	PSID
Std. of initial income distribution	σ_α	0.139	PSID
Unemployment probability	ω_t		Choi et al. (2015)
Unemployment income	κ	0.065	PSID
Replacement ratio	λ	0.671	PSID

11

Structural Estimation

Parameters to be estimated: discount factor, risk aversion, participation cost.

Targeted moments: mean of conditional/unconditional risky share, participation, and wealth averaged over *three* periods.

Minimize:

$$(\mathbf{m} - \hat{\mathbf{m}}(\gamma, \delta, \Phi))'\mathbf{W}(\mathbf{m} - \hat{\mathbf{m}}(\gamma, \delta, \Phi))$$

➔ Simulated method of moments (SMM).

SCF

12

Motivation
ooo
Unemployment Beliefs
ooo
Model
ooooo
Structural Estimation
ooooo
Conclusion
o

Results

	Baseline		Distorted expectations	
	(1)	(2)	(3)	(4)
Panel A: Estimated Parameters				
Relative risk aversion	18.056	12.739	11.846	7.792
Discount factor	0.455	0.623	0.749	0.719
Fixed participation cost		0.0166		0.0147
Panel B: Targeted life-cycle moments				
Risky share	✓		✓	
Conditional risky share		✓		✓
Participation rate		✓		✓
Wealth	✓	✓	✓	✓

13

Motivation
ooo

Unemployment Beliefs
ooo

Model
ooooo

Structural Estimation
oooeo

Conclusion
o

Results

Without Participation Cost

With Participation Cost

14

Effect Decomposition

Frederik Horn   University of Mannheim
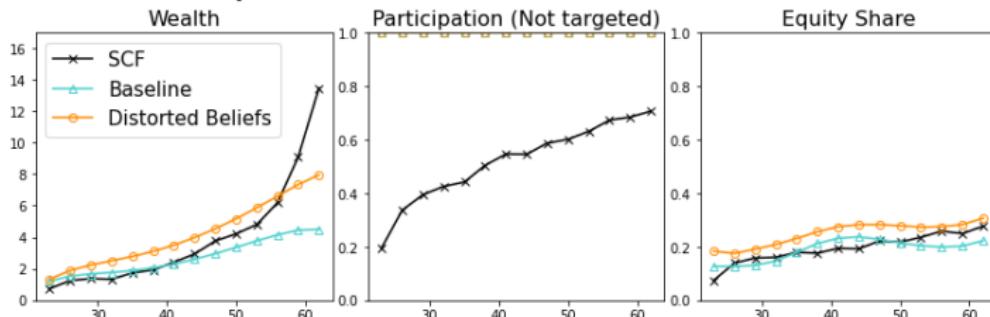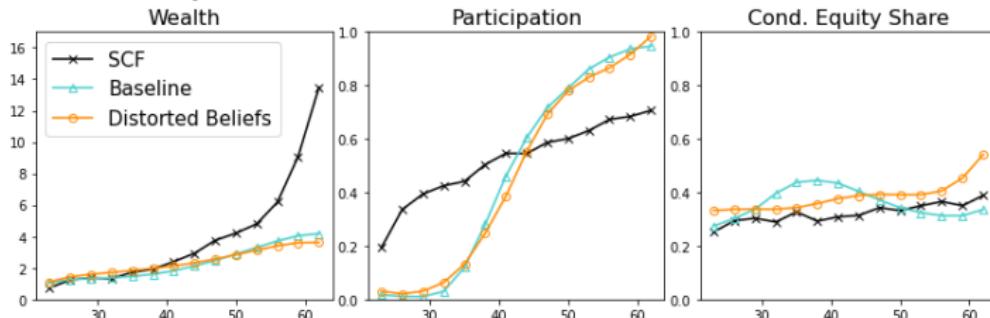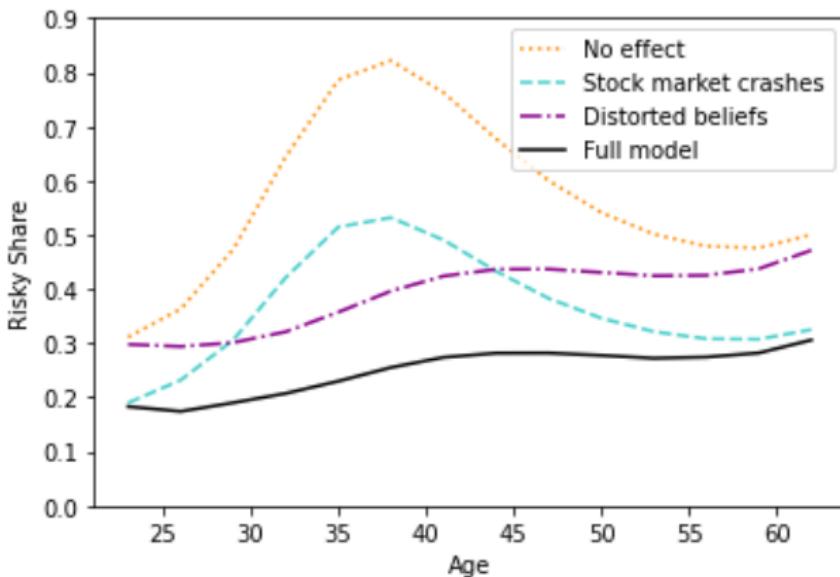
Conclusion

▶ Individuals strongly overestimate labor income disaster risk.

▶ Incorporating distorted beliefs into a life-cycle model improves model fit.

▶ Considering elicited beliefs helps to understand financial decision-making.

16

Data

	USA		Germany		Netherlands		Switzerland	
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Demographics								
Female	0.49	0.50	0.52	0.50	0.51	0.50	0.52	0.50
Age	50.05	15.14	46.74	17.42	47.46	17.28	48.40	17.63
Net Income	.	.	1463	1252	1247	6096	4918	4942
Education								
No Degree	0.34	0.47	0.13	0.34	0.44	0.50	0.23	0.42
Vocational	0.13	0.34	0.57	0.50	0.24	0.43	0.40	0.49
University	0.53	0.50	0.19	0.40	0.32	0.47	0.37	0.48
Employment								
Employed	0.68	0.47	0.59	0.49	0.57	0.50	0.61	0.49
Unemployed	0.09	0.29	0.07	0.26	0.03	0.17	0.01	0.11
Jobloss								
Expectation	0.15	0.21	0.19	0.25	0.18	0.26	0.19	0.24
Actual	0.06	0.24	0.10	0.30	0.03	0.16	0.02	0.12

1

Persistence of Unemployment Beliefs

	Germany		Netherlands		Switzerland	
	Unemployment Exp.		Unemployment Exp.		Unemployment Exp.	
Unemp. Exp.(t-2)	0.389***	0.391***				
	(68.51)	(68.49)				
Unemp. Exp.(t-1)			0.466***	0.466***	0.416***	0.415***
			(83.78)	(83.61)	(36.15)	(35.93)
Year FE	NO	YES	NO	YES	NO	YES
Observations	50,353	50,353	76,147	76,147	18,199	18,199
Adjusted R^2	0.146	0.149	0.211	0.213	0.161	0.165

Distributon of Unemployment Expectations
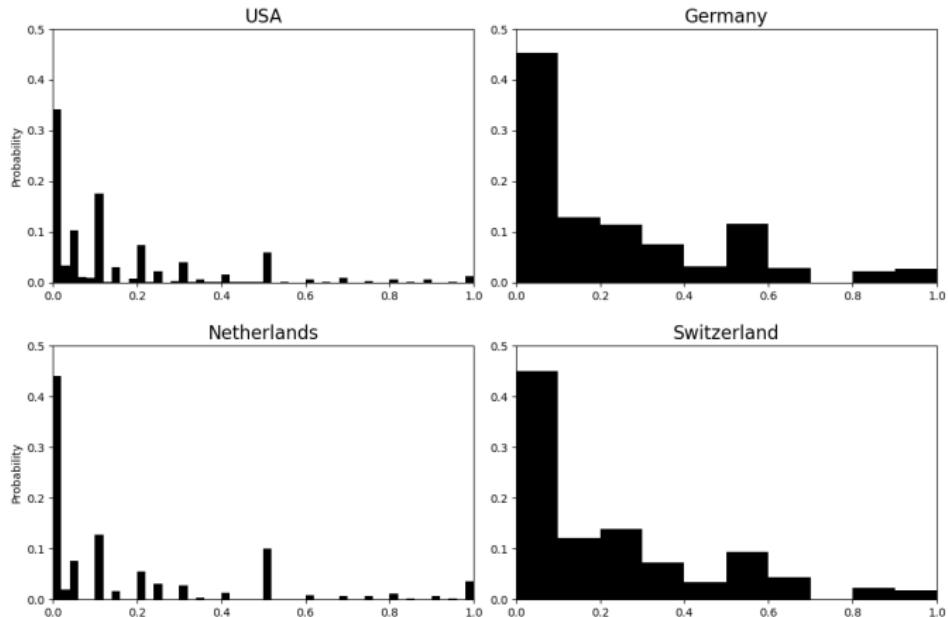
SCF Summary Statistics

|	Mean	Std. Deviation	Observations
Age	43.36	12.55	136,285
Wealth	285,847.79	1,145,659.09	136,285
Labor income	77,280.89	134,534.22	136,285
Stock market participation	0.49		136,285
Equity share	0.17	0.46	116,599
Cond. equity share	0.30	0.58	70,677

Back

4

Model Moments
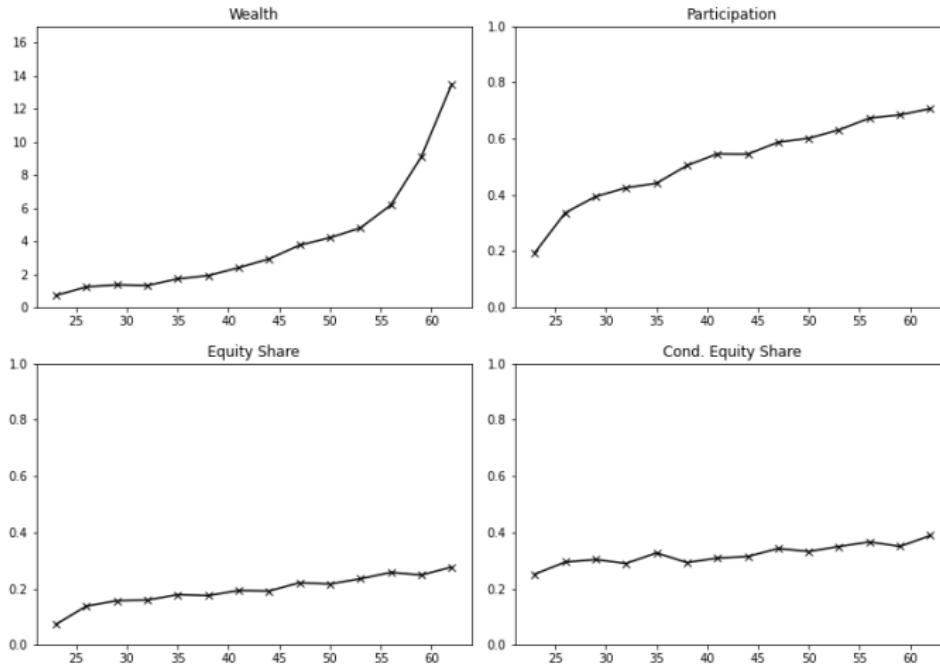
Discussion
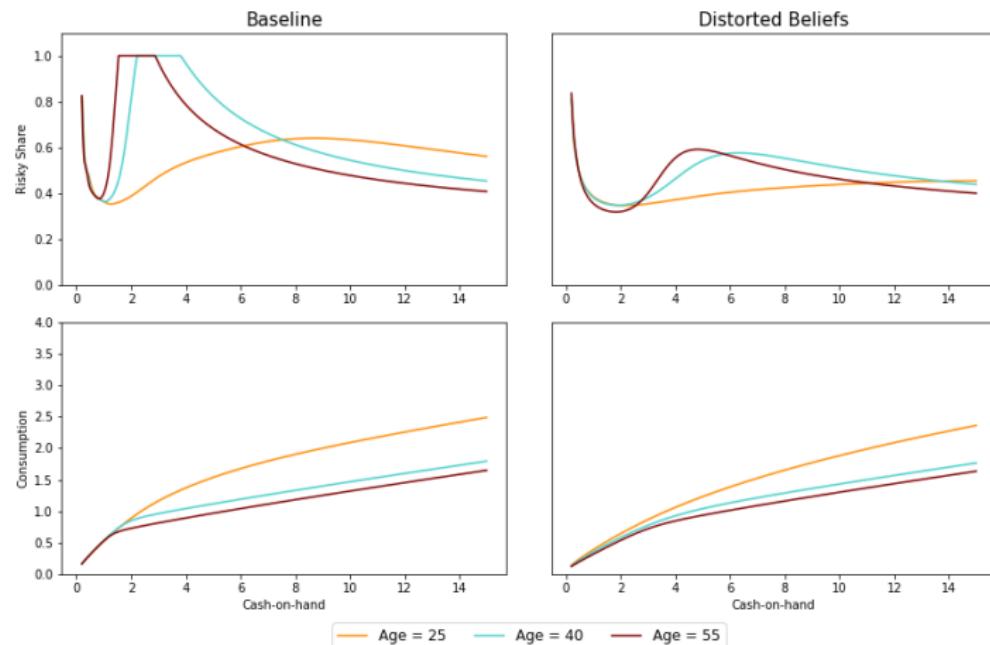
Discussion
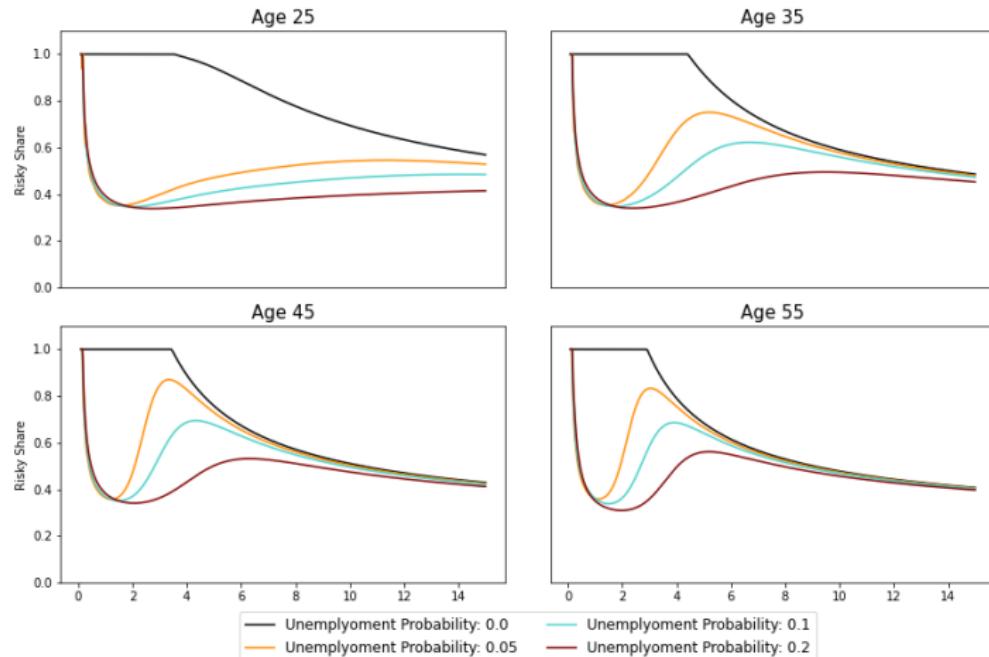
Effect Decomposition

Panel A: Without Participation Cost
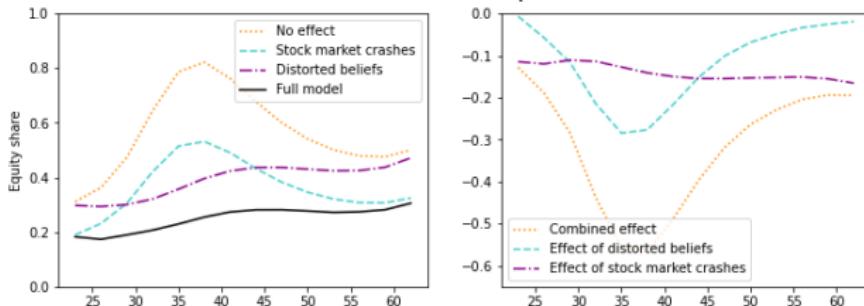
Panel B: With Participation Cost