Financial Knowledge Overconfidence

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Relevance

1. Financial knowledge (FK) has economic implications on all levels.
   1. Subprime mortgages (Gerardi et al; 2010), student debt (Mandell 1999), and family's wealth accumulation, debt, and savings (Lusardi et al; 2017).
2. General population fails to answer questions about essential financial concepts (TIAA Institute-GFLEC Personal Finance Index, 2022)
3. Why is this the case?

Literature Review

1. Macro-policy and education systems (Allgood et al; 2017, Gerardi et al; 2010).

2. Illusion of Knowledge/ Overconfidence Bias (Tversky and Kahneman, 1971) $\implies$ existence of Percieved and Actual Financial Knowledge (PFK, AFK).

   1. Financial knowledge and self-perceptions on money illusion (Celiktas and Yilmaz; 2020).
   2. Objective and subjective measures of financial knowledge and financial planning behavior (Atlas et al; 2019).
   3. PFK may be as, or more, influential than AFK in predicting financial behavior (Allgood, 2012).

3. Indicates Overconfidence might be key in understanding problems FK updation.

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   1. Adoption of unreliable portfolio strategies (Bondt and Thaler, 1995).
   2. Investors' choice of investment concentration (Domian et al, 2007).
   3. Wealth and investing power explaining overconfidence (Fast et al, 2012).

Underlying Model (still want to explore theoretically)

Some individual i follows:

1. AFK: $\phi_{AFK} \in [\underline{\phi}_{AFK}, \bar{\phi}_{AFK}]$, for $[\underline{\phi}_{AFK}, \bar{\phi}_{AFK}] \in \mathbb{R}_+$ (unknown)

2. Beliefs on AFK follow dist. $f_{\phi_{AFK}}$

3. Then,

$$E[\phi_{AFK}] = \int_{\underline{\phi}_{AFK}}^{\bar{\phi}_{AFK}} \phi_{AFK} f_{\phi_{AFK}} \, d\phi_{AFK}$$

4. Let $\phi_{PFK} := E[\phi_{AFK}]$ then define Ω

$$\Omega := \frac{\phi_{AFK}}{\phi_{PFK}}.$$

Where Ω is a measure of confidence.

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Then Ω follows:

$$\Omega = \begin{cases} \frac{\bar{\phi}_{AFK}}{\underline{\phi}_{AFK}} > \Omega > 1 \iff \phi_{AFK} > \phi_{PFK} \implies \text{"Underconfidence"} \\ 1 \iff \phi_{AFK} = \phi_{PFK} \implies \text{"Perfect Confidence"} \\ \frac{\phi_{AFK}}{\phi_{AFK}} < \Omega < 1 \iff \phi_{AFK} < \phi_{PFK} \implies \text{"Overconfidence"}. \end{cases}$$

Structural Model

1. Interested in predicting variance in Overconfidence.
2. **Variables**: Financial Shocks(σ), Financial Hardships(η), Financial Well-Being (γ), Vector of Individual Characteristics (ζ).

$$\Omega_i = \beta_0 + \beta_1\sigma_i + \beta_2\eta_i + \beta_3\gamma_i + \beta_4\zeta_i \tag{1}$$

Data

Consumer Finance Protection Bureau's "National Financial-Well being Survey" (2016).

Panel data at the individual level about:

1. **Demographics**: Age, gender, MSA region, Health etc.

2. **Financial Knowledge**: Consumer Financial Protection Bureaus' Financial Skill Scale, Lusardi and Mitchell Scale, and Knotts scale.

3. **Financial well-being**: Hardships, shocks, investments, wealth, and benefits.

1. ϕ_{PFK}: Averaging scores from different survey questions (scored out of 100).
   1. "Rate your overall financial knowledge".
   2. Cronbach's alpha (a measure of internal consistency) of 0.89 justified averaging.
   3. Min-Max normalized [1,10]
2. ϕ_{AFK}: Knoll and Houts (2019).
   1. "Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?".
   2. Average of scores on both scaled to score out of 100.
   3. Min-Max normalized [1,10]

1. σ: Exposure (yes or no) to 8 different financial shocks.
   1. Assigning a score of 1 to a participant for every shock they answered yes, scaled to score out of 100.
   2. "Had a health emergency".
2. η: Systemic problems (Hardships).
   1. 6 questions that captured the prevalence of hardships, scaled score to 100.
   2. "Couldn't afford a place to live".

Variable Generation (Cont.)

1. γ: Based on scores on the Financial Well-Being scale developed by CFPB.
   1. Item Response Theory-based measured scored out of 100.
   2. "I am concerned that the money I have or will save won't last".
2. ζ: Demographic/ Individual characteristics included as dummies.
   1. Gender, Employment Status, Highest Education, Ethnicity, Marital Status, Health, Age Category, Household Size, Household Income, and Census Division.
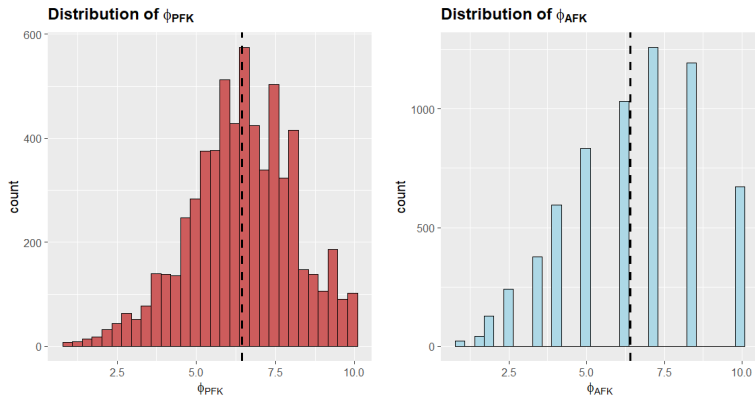
Figure: AFK and PFK Distribution

Distributions
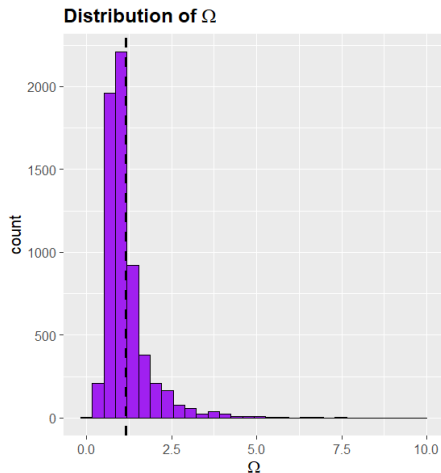

Distribution of Ω

Figure: Distribution of Overconfidence

Results Model 1

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.6726	0.1066	6.31	0.0000
Shocks	-0.0032	0.0007	-4.55	0.0000
Hardship	0.0085	0.0008	10.28	0.0000
FWBscore	0.0091	0.0007	12.99	0.0000
factor(PPGENDER)2	0.0635	0.0158	4.02	0.0001
factor(PPEDUC)2	0.0057	0.0341	0.17	0.8683
factor(PPEDUC)3	-0.0698	0.0346	-2.02	0.0438
factor(PPEDUC)4	-0.2086	0.0376	-5.55	0.0000
factor(PPEDUC)5	-0.2150	0.0392	-5.49	0.0000
factor(PPETHM)2	0.3423	0.0258	13.24	0.0000
factor(PPETHM)3	0.0993	0.0339	2.93	0.0034
factor(PPETHM)4	0.2497	0.0244	10.24	0.0000
factor(agecat)2	0.0178	0.0398	0.45	0.6555
factor(agecat)3	-0.0547	0.0433	-1.26	0.2070
factor(agecat)4	-0.1453	0.0431	-3.37	0.0007
factor(agecat)5	-0.2165	0.0461	-4.70	0.0000
factor(agecat)6	-0.2210	0.0478	-4.62	0.0000
factor(agecat)7	-0.2729	0.0544	-5.02	0.0000
factor(agecat)8	-0.2539	0.0542	-4.69	0.0000
factor(PPINCIMP)2	-0.1571	0.0356	-4.42	0.0000
factor(PPINCIMP)3	-0.2446	0.0344	-7.10	0.0000
factor(PPINCIMP)4	-0.2448	0.0376	-6.50	0.0000
factor(PPINCIMP)5	-0.3101	0.0373	-8.31	0.0000
factor(PPINCIMP)6	-0.2937	0.0358	-8.20	0.0000
factor(PPINCIMP)7	-0.2951	0.0342	-8.63	0.0000
factor(PPINCIMP)8	-0.3359	0.0349	-9.62	0.0000
factor(PPINCIMP)9	-0.3496	0.0381	-9.18	0.0000

Table: Model 1

Results 1.1

	Estimate	Std. Error	t value	Pr($>$|t|)
(Intercept)	0.4971	0.1153	4.31	0.0000
DISTRESS	-0.0108	0.0082	-1.32	0.1879
SWB_1	0.0481	0.0075	6.38	0.0000
SWB_2	0.0201	0.0071	2.82	0.0048
Shocks	-0.0028	0.0007	-4.02	0.0001
Hardship	0.0089	0.0008	10.80	0.0000
FWBscore	0.0063	0.0008	8.43	0.0000
factor(PPGENDER)2	0.0609	0.0158	3.86	0.0001
factor(PPEDUC)2	0.0198	0.0339	0.58	0.5600
factor(PPEDUC)3	-0.0616	0.0344	-1.79	0.0734
factor(PPEDUC)4	-0.1882	0.0373	-5.05	0.0000
factor(PPEDUC)5	-0.1975	0.0389	-5.07	0.0000
factor(PPETHM)2	0.3222	0.0260	12.41	0.0000
factor(PPETHM)3	0.0908	0.0335	2.71	0.0067
factor(PPETHM)4	0.2152	0.0243	8.85	0.0000
factor(agecat)2	0.0262	0.0393	0.67	0.5053
factor(agecat)3	-0.0411	0.0428	-0.96	0.3375
factor(agecat)4	-0.1219	0.0426	-2.86	0.0043
factor(agecat)5	-0.2016	0.0457	-4.41	0.0000
factor(agecat)6	-0.2018	0.0475	-4.25	0.0000
factor(agecat)7	-0.2586	0.0541	-4.78	0.0000
factor(agecat)8	-0.2517	0.0538	-4.68	0.0000
factor(PPINCIMP)2	-0.1336	0.0353	-3.78	0.0002
factor(PPINCIMP)3	-0.2211	0.0341	-6.48	0.0000
factor(PPINCIMP)4	-0.2189	0.0373	-5.87	0.0000
factor(PPINCIMP)5	-0.2928	0.0370	-7.92	0.0000
factor(PPINCIMP)6	-0.2744	0.0355	-7.72	0.0000
factor(PPINCIMP)7	-0.2692	0.0341	-7.91	0.0000
factor(PPINCIMP)8	-0.3097	0.0347	-8.93	0.0000
factor(PPINCIMP)9	-0.3205	0.0378	-8.48	0.0000

Table: Model 1.1

Linear Probablity Model 2

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.2037	0.0855	2.38	0.0172
Shocks	-0.0021	0.0006	-3.63	0.0003
Hardship	0.0040	0.0007	6.08	0.0000
FWBscore	0.0061	0.0006	10.81	0.0000
factor(PPGENDER)2	0.0570	0.0127	4.50	0.0000
factor(PPEDUC)2	0.0333	0.0274	1.22	0.2237
factor(PPEDUC)3	-0.0024	0.0278	-0.09	0.9320
factor(PPEDUC)4	-0.1251	0.0301	-4.15	0.0000
factor(PPEDUC)5	-0.1403	0.0314	-4.46	0.0000
factor(PPETHM)2	0.2173	0.0207	10.48	0.0000
factor(PPETHM)3	0.0469	0.0272	1.73	0.0843
factor(PPETHM)4	0.1589	0.0196	8.12	0.0000
factor(agecat)2	0.0048	0.0320	0.15	0.8813
factor(agecat)3	-0.0700	0.0348	-2.01	0.0440
factor(agecat)4	-0.1141	0.0346	-3.30	0.0010
factor(agecat)5	-0.1639	0.0370	-4.43	0.0000
factor(agecat)6	-0.2008	0.0384	-5.23	0.0000
factor(agecat)7	-0.2123	0.0437	-4.86	0.0000
factor(agecat)8	-0.2303	0.0435	-5.30	0.0000
factor(PPINCIMP)2	-0.0814	0.0285	-2.85	0.0044
factor(PPINCIMP)3	-0.0856	0.0276	-3.10	0.0020
factor(PPINCIMP)4	-0.0839	0.0302	-2.78	0.0055
factor(PPINCIMP)5	-0.1591	0.0299	-5.31	0.0000
factor(PPINCIMP)6	-0.1154	0.0287	-4.02	0.0001
factor(PPINCIMP)7	-0.1252	0.0275	-4.56	0.0000
factor(PPINCIMP)8	-0.1795	0.0280	-6.41	0.0000
factor(PPINCIMP)9	-0.2136	0.0306	-6.99	0.0000

Table: Model 2

Linear Probability 2.1

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.1059	0.0937	1.13	0.2582
DISTRESS	-0.0055	0.0067	-0.82	0.4124
SWB_1	0.0173	0.0061	2.83	0.0047
SWB_2	0.0244	0.0058	4.23	0.0000
Shocks	-0.0020	0.0006	-3.55	0.0004
Hardship	0.0042	0.0007	6.21	0.0000
FWBscore	0.0045	0.0006	7.31	0.0000
factor(PPGENDER)2	0.0548	0.0128	4.28	0.0000
factor(PPEDUC)2	0.0452	0.0275	1.64	0.1011
factor(PPEDUC)3	0.0088	0.0279	0.31	0.7531
factor(PPEDUC)4	-0.1096	0.0303	-3.62	0.0003
factor(PPEDUC)5	-0.1271	0.0316	-4.02	0.0001
factor(PPETHM)2	0.1952	0.0211	9.26	0.0000
factor(PPETHM)3	0.0466	0.0272	1.71	0.0871
factor(PPETHM)4	0.1390	0.0198	7.03	0.0000
factor(agecat)2	0.0012	0.0320	0.04	0.9690
factor(agecat)3	-0.0707	0.0348	-2.03	0.0421
factor(agecat)4	-0.1093	0.0347	-3.15	0.0016
factor(agecat)5	-0.1621	0.0371	-4.37	0.0000
factor(agecat)6	-0.1950	0.0386	-5.05	0.0000
factor(agecat)7	-0.2104	0.0440	-4.79	0.0000
factor(agecat)8	-0.2282	0.0437	-5.22	0.0000
factor(PPINCIMP)2	-0.0742	0.0287	-2.59	0.0097
factor(PPINCIMP)3	-0.0764	0.0277	-2.76	0.0059
factor(PPINCIMP)4	-0.0735	0.0303	-2.42	0.0154
factor(PPINCIMP)5	-0.1514	0.0301	-5.04	0.0000
factor(PPINCIMP)6	-0.1114	0.0289	-3.86	0.0001
factor(PPINCIMP)7	-0.1180	0.0277	-4.27	0.0000
factor(PPINCIMP)8	-0.1723	0.0282	-6.12	0.0000
factor(PPINCIMP)9	-0.2048	0.0307	-6.67	0.0000

Table: Model 2.1