Dissertation Research Proposal: Essays on experimental assets markets and financial decision making.

Joe Seidel

Indiana University

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Contents

Personal Characteristics, Traders' Performance and Bubbles in Small and Large Online Asset Markets

"Invisible hand wave" argument: individual biases do not matter in competitive markets (Thaler, 2015)

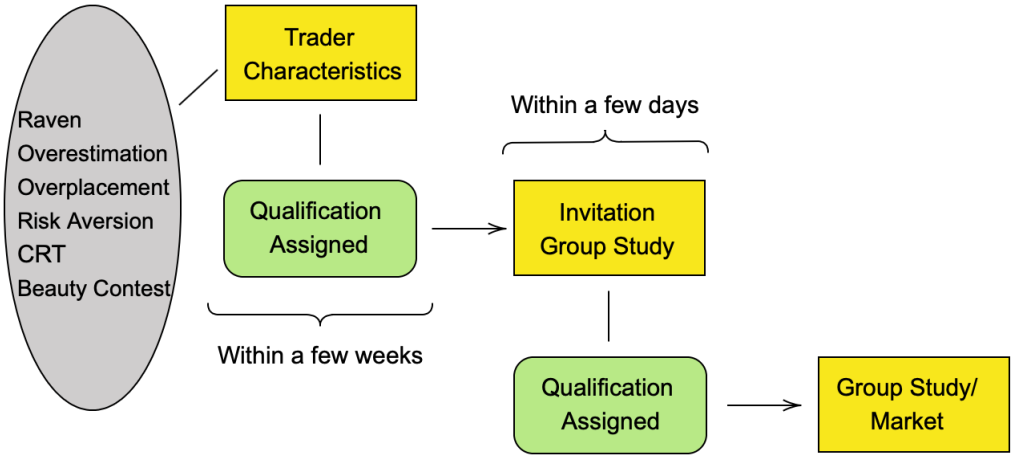
- Are bubbles robust to large markets?
- How robust are the laboratory markets results with student populations to other populations?
- Is there any/more support for the "invisible hand wave" argument in large markets?
- Are traders' characteristics related to traders' performance and their strategies?

What do we do?

Contributions

- Methodological: implement online markets [Arechar et al., 2018]
- Compare individual and aggregate outcomes in small and large markets with different populations
  - [Hommes et al., 2021, Weitzel et al., 2019, Williams, 2008, Bossaerts and Plott, 2004]
- Study the relationship between trader's characteristics (cognitive skills, overconfidence, strategic intelligence), their performance and bubble formation in a unified framework
  - Cognitive finance [Bosch-Rosa and Corgnet, Bosch-Rosa et al., 2018, Corgnet et al., 2018, Miklánek and Zajíček, 2020]
  - Overconfidence [Michailova and Schmidt, 2016, Ahrens et al., 2019],

MTurk Implementation



Session Summary

Market Sessions

Session	Treatment	No. of Markets	Subjects
Lg.1	Large Call Market	2	52
Lg.2	Large Call Market	2	33
Lg.3	Large Call Market	2	56
Lg.4	Large Call Market	2	40
Lg.5	Large Call Market	2	44
Sm.1	Small Call Market	2	19
Sm.2	Small Call Market	2	12
Sm.3	Small Call Market	2	19
Sm.4	Small Call Market	2	14
Sm.5	Small Call Market	2	10
Stu. 1-5	Student Markets	1	9

- Avg market earning: \$10.05, Avg Trader Char. earning: \$3.91
- total market subjects : 299 (MTurk), 45 (students)
- individual tasks from April 2021 to October 2021: 532

The environment

Smith, Suchanek and Williams, 1988

- Finite horizon
- Asset has a life of 10 periods
- At the end of each period asset yields $\{0, 8, 28, 60\}$ with equal probability, i.i.d. over time
- After final dividend realization, assets are worthless
- Sequence of two markets
- Total franc holdings at the end of the final period of a randomly selected market are converted to USD and paid to the subjects

Conjectures

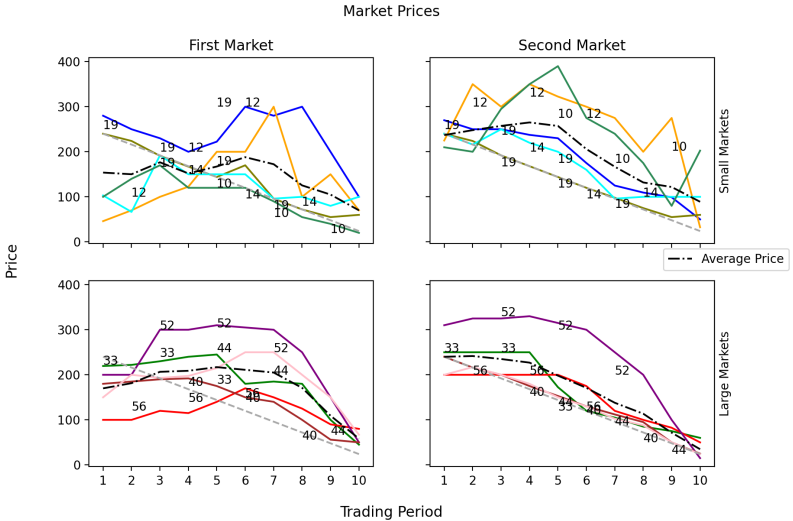
Aggregate Level

- Conjecture 1: Bubbles are smaller in larger markets

Individual Level

- Conjecture 2: Personal characteristics matter less in larger markets.

Small vs Large Overview (MTurk/Online)



Summary of Findings

Aggregate

- Bubbles are robust to market size and Mturk environment
- Outcomes are similar to markets populated by students

$\Rightarrow$ Advantages: cheaper, easier to address external validity criticisms and to reach different populations; Disadvantage: less control than in the lab

Table 1: Participant Earnings

	Dependent variable: Earnings		
	All	Small	Large
	(1)	(2)	(3)
Raven	0.001	-0.018	0.013
	(0.014)	(0.027)	(0.011)
Overestimation	0.002	0.029	-0.005
	(0.025)	(0.034)	(0.032)
Overplacement	-0.004	-0.030	0.008
	(0.015)	(0.030)	(0.015)
Risk Aversion	-0.004	-0.026	0.010
	(0.026)	(0.035)	(0.039)
CRT	0.160**	0.032	0.204**
	(0.070)	(0.060)	(0.087)
BCG Guess	-0.001	0.005*	-0.005
	(0.004)	(0.003)	(0.006)
Strategic Int.	0.002	0.002	0.005
	(0.003)	(0.007)	(0.004)
Constant	9.869***	10.020***	9.711***
	(0.251)	(0.255)	(0.314)
Observations	550	124	426
R^2	0.017	0.048	0.031
Adjusted R^2	0.005	-0.010	0.015
Residual Std. Error	1.297 (df = 542)	1.022 (df = 116)	1.356 (df = 418)
F Statistic	1.363 (df = 7; 542)	0.834 (df = 7; 116)	1.936* (df = 7; 418)

Note: *p<0.1; **p<0.05; ***p<0.01
Clustered SE at session level.

Table 2: Trader Activity

	Bids	Contracts to Buy	Asks	Contracts to Sell	Total Contracts
	(1)	(2)	(3)	(4)	(5)
Raven	8.682	-0.136	1.281**	0.191	0.055
	(8.435)	(0.340)	(0.559)	(0.146)	(0.270)
Overestimation	4.593	-0.076	-1.175	-0.150	-0.226
	(6.933)	(0.242)	(0.802)	(0.131)	(0.145)
Overplacement	4.658	0.026	0.961*	0.161*	0.187
	(3.802)	(0.187)	(0.503)	(0.097)	(0.249)
Risk Aversion	12.809	-0.330*	-2.228***	-0.287*	-0.618**
	(9.933)	(0.183)	(0.858)	(0.156)	(0.263)
CRT	37.324	-0.055	5.039*	1.613***	1.558***
	(30.526)	(0.467)	(2.687)	(0.387)	(0.525)
BCG Guess	-2.725	0.063**	0.188*	-0.016	0.047
	(2.874)	(0.029)	(0.096)	(0.028)	(0.055)
Strategic Int.	3.164	-0.039	-0.273**	-0.022	-0.062
	(4.179)	(0.036)	(0.121)	(0.037)	(0.067)
Constant	-69.037	10.042**	18.174***	6.606***	16.649***
	(138.954)	(4.051)	(5.628)	(1.983)	(3.934)
Observations	550	550	550	550	550
R^2	0.026	0.013	0.088	0.087	0.028
Adjusted R^2	0.014	0.0001	0.076	0.075	0.016
Residual Std. Error (df = 542)	465.367	13.314	41.255	8.347	16.829
F Statistic (df = 7; 542)	2.080**	1.009	7.461***	7.339***	2.271**

Note: *p<0.1; **p<0.05; ***p<0.01
Clustered standard errors at session level

Table 3: Trader Activity – Prices Below FV

	Bids	Contracts to Buy	Asks	Contracts to Sell	Total Contracts
	(1)	(2)	(3)	(4)	(5)
Raven	2.354**	0.051	0.071	-0.025	0.025
	(1.028)	(0.041)	(0.102)	(0.038)	(0.067)
Overestimation	0.448	-0.058	-0.301	0.0004	-0.058
	(1.001)	(0.061)	(0.263)	(0.045)	(0.066)
Overplacement	2.161***	0.043	0.187	-0.015	0.028
	(0.703)	(0.040)	(0.158)	(0.017)	(0.040)
Risk Aversion	2.180	-0.004	-0.338	0.051	0.047
	(2.477)	(0.084)	(0.323)	(0.059)	(0.092)
CRT	-1.785	0.388**	0.989	-0.126	0.263
	(7.526)	(0.158)	(0.632)	(0.154)	(0.267)
BCG Guess	0.188**	0.013	0.023**	-0.0001	0.013
	(0.088)	(0.009)	(0.009)	(0.010)	(0.008)
Strategic Int.	-0.692***	-0.007	-0.045	-0.011	-0.018
	(0.171)	(0.014)	(0.028)	(0.017)	(0.029)
Constant	-6.003	-0.115	3.937***	2.035***	1.920**
	(21.068)	(0.656)	(1.526)	(0.563)	(0.761)
Observations	550	550	550	550	550
R^2	0.016	0.014	0.025	0.007	0.008
Adjusted R^2	0.003	0.001	0.013	-0.005	-0.005
Residual Std. Error (df = 542)	129.767	5.558	12.968	3.192	6.162
F Statistic (df = 7; 542)	1.220	1.090	1.994*	0.578	0.596

Note: *p<0.1; **p<0.05; ***p<0.01
Clustered standard errors at session level

Table 4: Trader Activity – Before Price Peak

	Bids	Contracts to Buy	Asks	Contracts to Sell	Total Contracts
	(1)	(2)	(3)	(4)	(5)
Raven	0.729	0.117*	0.081	-0.085	0.032
	(1.370)	(0.064)	(0.150)	(0.081)	(0.090)
Overestimation	-0.513	-0.010	-0.378*	-0.150	-0.160*
	(1.037)	(0.036)	(0.221)	(0.093)	(0.092)
Overplacement	2.519***	0.064	0.275**	0.050	0.114
	(0.586)	(0.068)	(0.123)	(0.035)	(0.074)
Risk Aversion	2.378	0.018	-0.324	-0.061	-0.043
	(1.935)	(0.068)	(0.313)	(0.065)	(0.093)
CRT	6.158*	0.526***	1.745***	0.434**	0.960***
	(3.631)	(0.096)	(0.371)	(0.213)	(0.260)
BCG Guess	-0.056	0.011	0.003	-0.003	0.008
	(0.190)	(0.012)	(0.011)	(0.008)	(0.015)
Strategic Int.	-0.352	-0.005	-0.022	-0.019	-0.023
	(0.232)	(0.018)	(0.030)	(0.016)	(0.034)
Constant	15.449	-0.624	4.243**	3.792***	3.168***
	(34.349)	(0.851)	(1.741)	(0.916)	(1.197)
Observations	550	550	550	550	550
R^2	0.015	0.018	0.035	0.026	0.028
Adjusted R^2	0.002	0.006	0.023	0.013	0.015
Residual Std. Error (df = 542)	140.084	6.368	14.348	4.716	8.115
F Statistic (df = 7; 542)	1.147	1.445	2.835***	2.050**	2.204**

Note: *p<0.1; **p<0.05; ***p<0.01
Clustered standard errors at session level

Table 5: Trader Activity – After Price Peak

	Bids	Contracts to Buy	Asks	Contracts to Sell	Total Contracts
	(1)	(2)	(3)	(4)	(5)
Raven	4.408	-0.036	0.651	0.192	0.156
	(6.082)	(0.126)	(0.566)	(0.117)	(0.187)
Overestimation	3.927	-0.112	-0.280	-0.027	-0.139
	(5.076)	(0.203)	(0.283)	(0.089)	(0.139)
Overplacement	1.529	0.094	0.589	0.121	0.215
	(1.401)	(0.130)	(0.429)	(0.081)	(0.192)
Risk Aversion	11.075*	-0.094	-0.871**	-0.071	-0.165
	(6.138)	(0.136)	(0.401)	(0.116)	(0.150)
CRT	37.358	-0.356	3.369**	0.997***	0.641***
	(23.154)	(0.312)	(1.455)	(0.288)	(0.166)
BCG Guess	-2.504	0.043*	0.119***	-0.003	0.039
	(2.152)	(0.023)	(0.035)	(0.018)	(0.033)
Strategic Int.	2.828	-0.032	-0.191***	-0.012	-0.043
	(3.095)	(0.020)	(0.053)	(0.021)	(0.032)
Constant	-76.267	3.485*	5.612	0.070	3.555
	(105.452)	(1.986)	(7.311)	(1.971)	(2.725)
Observations	550	550	550	550	550
R^2	0.026	0.016	0.057	0.051	0.024
Adjusted R^2	0.014	0.003	0.044	0.038	0.011
Residual Std. Error (df = 542)	398.978	8.224	28.103	6.827	10.645
F Statistic (df = 7; 542)	2.079**	1.275	4.648***	4.139***	1.909*

Note: *p<0.1; **p<0.05; ***p<0.01
Clustered standard errors at session level

Summary of Results

Trader Activity and Performance

- CRT scores are strongest predictor of individual earnings and overall trading activity
- Risk aversion negatively related to trading activity
- Cognitive and strategic intelligence predict bidding activity when prices are below FV
- Overconfidence predicts bidding activity behavior before price peaks.
- Strategic intelligence predicts intention to sell after price peaks.

Conclusion

More work to do

- Heterogeneity of traders' skills and individual earnings.
- Use machine learning tools to gauge the relative importance of different characteristics
- Level of activity × Market Number × Market size × Trader skills
- Participation and selection into markets

Implementing an Infinite Horizon in Dynamic Asset Pricing Experiments

General Idea

Investigate different approaches to implementing an infinite horizon in laboratory markets: a random stopping rule and definite + discounting.

Motivation

- Absent behavioral biases, implementation should not matter
- Biases are introduced into the model to generate differences
- Some implementations may be more conducive to theoretical predictions

Related Literature

The indefinite horizon

- Prisoners dilemma: Dal Bó and Fréchette [2018], Fréchette and Yuksel [2017]
- SSW: Jiang et al. [2020]
- Lucas Asset Markets: Duffy et al. [2020], Crockett et al. [2018]

Experimental Setting

General

- Market with N traders (including yourself)
- You will start with k_0^i of an item that produces d francs at the start of every trading period.
- You will receive y^i francs in even periods and 0 in odd periods.
- Any amount of francs left in your trading account will be converted to cash and stored in your payment account.
- Earnings from one of the trading sequences will be randomly determined to be paid to you in cash.

Decision Screen

Market -- Period 1 of 3

Your Francs

From dividends: 1.00

From endowment: 101

Total: 102.00 francs

Allocation to Payment Account

0 — 102.00

Amount: 51 Remaining Balance: 51.00

Value: $0.93 Endowment next period: 5 Weighted Value: $0.93

Your Assets: 1.00 asset(s)

Buy Order

Number of assets you want to buy: 0.00

Max total cost: 0

The highest price at which to buy: 0.00 francs

Sell Order

Number of assets you want to sell: 0.00

Min total value: 0

The lowest price at which to sell: 0.00 francs

Submit

Prediction Screen

Making Predictions -- Period 1 of 3

Price forecast for the upcoming period:

francs

Next

Price History

Period	Trading Price

Instructions

In addition to the money you earn from your trading activity, you can make money by accurately forecasting the trading price of the upcoming period. You will indicate your forecast in the text input above.

The money you receive from your forecasts will be calculated in the following manner

Accuracy	Your earnings
Within 10% of actual trading price	$0.07
Within 25% of actual trading price	$0.02
Within 50% of actual trading price	$0.01

Treatment

Random Termination

- A random draw determines if the trading sequence will continue
- Probability π to continue

Definite + Discounting

- The current trading sequence will last $\frac{1}{1-\pi}$ periods.
- Each period your francs to be converted to cash will be multiplied by a factor $\pi^t < 1$
- After the final period, payoffs for subsequent rounds will be simulated based on your previous actions

Hypothesis

Theory

The environment can be modeled using Lucas Asset Pricing Model with one tree

Hypothesis

- Agents smooth consumption by trading in every period
- If agents have no behavioral biases, no difference in prices across treatments
- If agents are risk averse prices will be lower in RT treatments
- If subjects predictions are consistent with rational expectations, forecasts should be equal to the predicted prices (table in appendix)

Summary

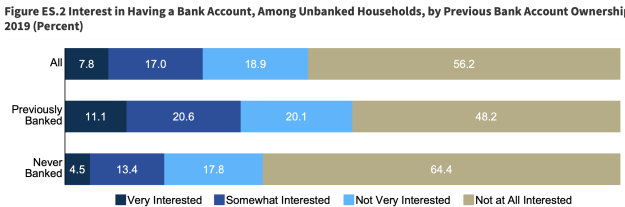
Project Status

- Designed experiment
- Instructions and program are complete
- Motivation, theory, predictions and hypothesis are written up

Banking Decisions and Utilization of Financial Services in Online Subject Pools.

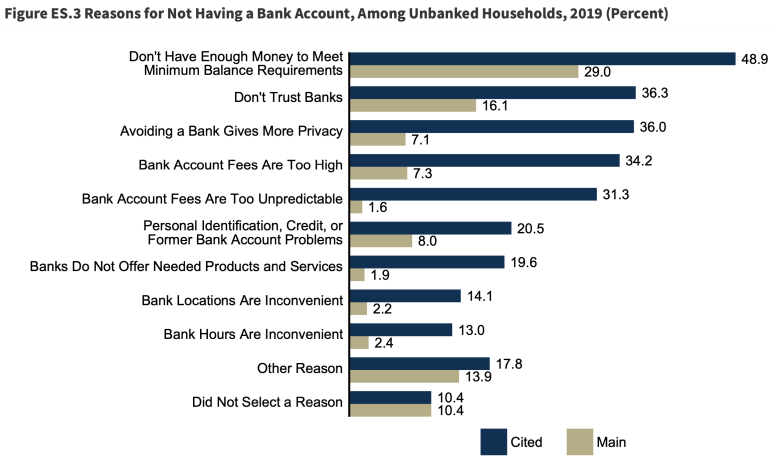
FDIC national estimate rate of unbanked household (2019): 5.4% or 7.1 million households

- Unbanked: no one in the household had a checking or savings account at a bank or credit union



Source: How America Banks: Household Use of Banking and Financial Services (FDIC 2019)

Reasons for not having a bank account



Source: How America Banks: Household Use of Banking and Financial Services (FDIC 2019)

Top 3 Reasons

1. Not enough money
2. Don't trust banks
3. Avoiding a bank gives more privacy

What does trust and privacy mean?

- related to unpredictable fees?
- concerns about banks failing?
- banks might take your money?

Why should we care?

Financial Inclusion

- 33% of unbanked report family income less than $30k
- 29% have no high school diploma

A digital currency

- Potential to help in the design of digital currency run by the Federal Reserve
- ex: If people avoid banks because banks only care about profits

Summary

What we are going to do

1. Replicate FDIC survey
   - MTurk
   - CloudResearch
   - Qualtric's Panel(?)
2. Evaluate whether online samples are representative of population in terms of financial decisions and banking behavior.
3. Develop a better understanding of why individuals are unbanked

Chapter II Predictions

Discount Factor	P_{DD} (FV)	$P_{1,RT}$	$P_{2,RT}$	$P_{17,RT}$		k_o	k_e	c
0.7	2.33	1.35	1.93	2.27	Type I	17.94	1	87.47
					Type II	0.06	17	86.53
0.9	9	7.33	8.15	8.8	Type I	6.05	1	81.53
					Type II	11.95	17	92.47
0.94	15.67	13.71	14.59	15.37	Type I	3.97	1	80.48
					Type II	14.03	17	93.52

Predictions $p_{t,RT}$ assume homegrown utility is CRRA with risk aversion parameter .5. Allocation and consumption prediction assume linear homegrown utility U.

Table 6: Prices and Allocations

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