

Decisionmaking Quality: Experimental Measures and their Correlates

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- Standard econ analysis attributes differences in choices to heterogeneity in:
 - Constraints
 - Preferences
 - Information
 - Beliefs

Background: Decision-making Ability

- More recent (empirical) studies consider another source
- **Decision-making ability**
- Examples:
 - Ameriks, Caplin, and Leahy (2003)
 - Bernheim and Garrett (2003)
 - Fang, Keane, and Silverman (2008)
 - Agarwal, Driscoll, Gabaix, and Laibson (2009)
 - *EJ* special issue (2010)
 - Abaluck and Gruber (2011)
 - Choi, Kariv, Müller, and Silverman (2014)
 - Ambuehl, Bernheim, and Lusardi (2014)

- Certain skills and knowledge seem to facilitate “better” decisions.
- Thus, actual choices may not match true objectives.
- Those with less decision-making ability (*DMA*) may make choices of lower decision-making quality (*DMQ*).

Conceptual and Practical Problems

- Makes sense that some decisions are better than others (*DMQ*)
- Makes sense that some people are better decision-makers than others (*DMA*)
- But what is “better?”
- How can we tell if someone tends to lower-quality decisions?

An identification problem

- Distinguish differences in *DMA* from unobserved differences in preferences, constraints, information, or beliefs

A measurement problem

- Define and implement a measure of *DMQ* that applies across domains and has an economic interpretation

Our Approach

- Measure DMQ by the consistency of choices with rationality (GARP)
 - If no utility function can rationalize a set of choices, then they are not purposeful, or high DMQ
- Present individuals with a choice experiment in which we can measure DMQ with precision.
 - Measure has economic interpretation and is portable across domains (measurement problem)
- Experiment holds information and beliefs constant within subject, and controls the relevant constraints.
 - Define DMA as capacity to make high DMQ choices
 - Experiment then addresses identification problem, *in the lab*

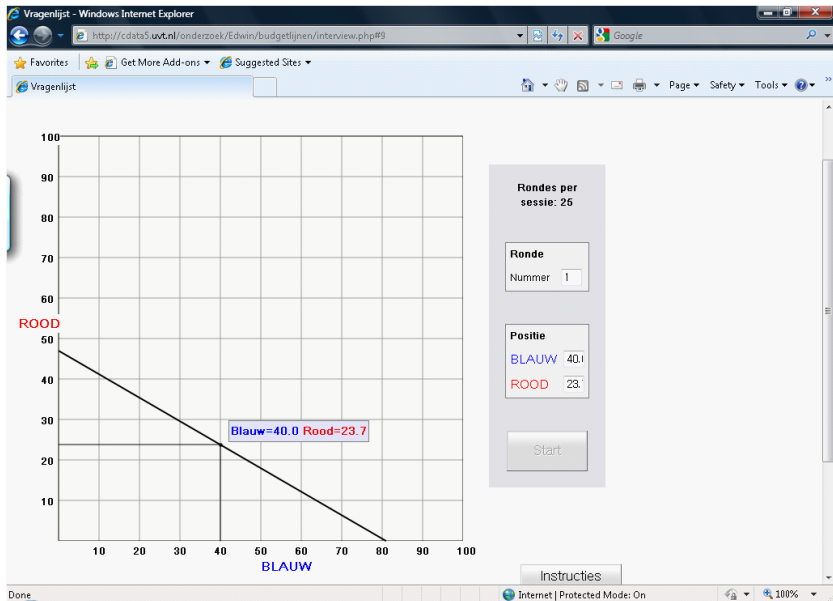
Our Approach (contd.)

- Interest in *DMQ* in the lab due mostly to the possibility that it reflects *DMA* important outside the lab.
- Implement experiment with a large and diverse samples of subjects
 - Panel data from two surveys in the Netherlands and two surveys in the US
 - Study relationship between *DMQ* in experiments and observable characteristics.
 - Evaluate in risk, time, and social preference domains
 - Do some characteristics predict choices because of they proxy *DMA*?
- Can *DMQ* in the experiment independently explain important economic outcomes?

Basic Structure of the Experiments

- Each subject faces 25-50 independent decision problems.
- Each problem is to choose a bundle of two contingent commodities X and Y from a budget line.
- In a risk experiment, allocation (x, y) pays either x or y , with equal probability.
- Budget lines vary randomly—crossing often.
- Payoffs calculated in terms of tokens (stakes usually low)
- One decision problem randomly selected, at the end, for payment.
- Experiment conducted via the web. Subjects point and click and are paid electronically.

Experiment: The Interface



Example: The CentERpanel

- Internet panel of 2,000 households (5,000 individuals)
- Representative of the Dutch-speaking population in the Netherlands.
- Panel data on demographic and economic variables.
 - Comprehensive household survey dates to 1993.
- Experiment conducted in 2009 with randomly selected subset
 - Approximately 700 households and 1,200 individuals completed the experiment

Generalized Axiom of Revealed Preference (GARP)

If x' is indirectly revealed preferred to x , then x is not strictly and directly revealed preferred to x' .

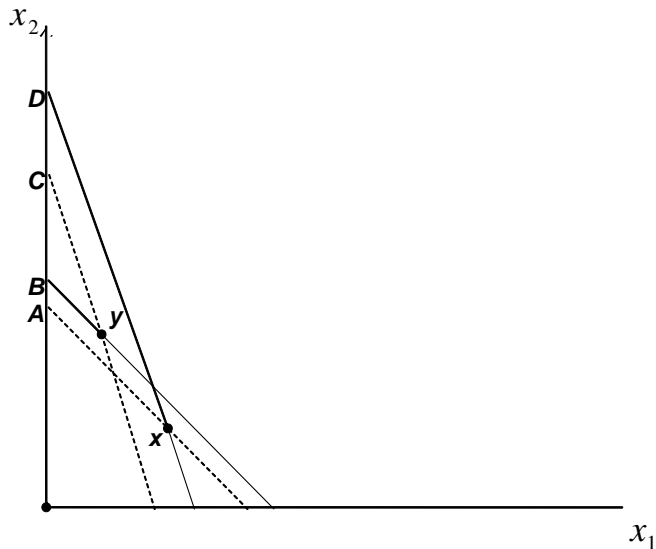
Afriat's Theorem *The following conditions are equivalent:*

- *The data satisfy GARP.*
- *There exists a non-satiated utility function that rationalizes the data.*
- *There exists a concave, monotonic, continuous, non-satiated utility function that rationalizes the data.*

Measuring Quality: The CCEI

- Quantification problem: choice data either satisfy GARP or they don't
- An answer: Afriat's critical cost efficiency index (CCEI)
 - CCEI is the amount by which budget constraints must be shifted in order to remove all violations of GARP.
 - $CCEI \in [0, 1]$ The closer one, the smaller the perturbation required to remove all violations.

Example $CCEI < 1$



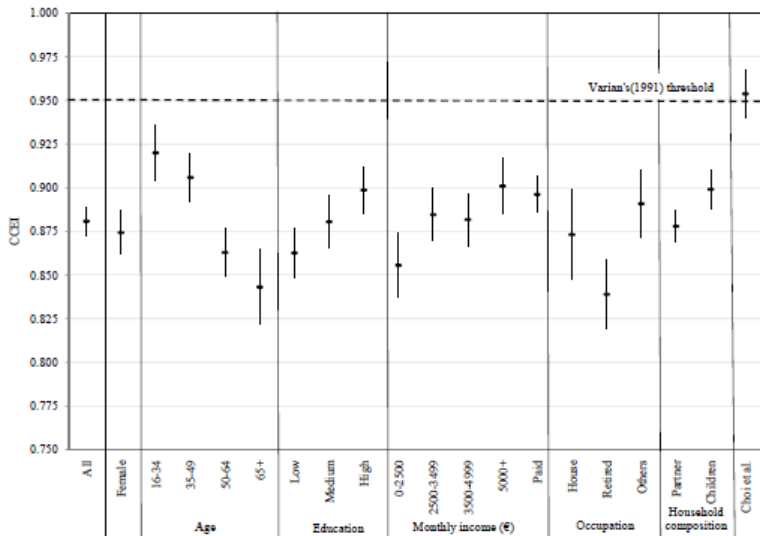
Distribution of CCEI

	Mean	S.D.	Percentiles					N
			10	25	50	75	90	
All	0.881	0.141	0.676	0.808	0.930	0.998	1.00	1,182
Female	0.874	0.147	0.666	0.796	0.928	0.998	1.00	537
Ages 50 – 64	0.863	0.142	0.666	0.784	0.901	0.985	1.00	421

- Large fractions have virtually no violations.
- Substantial heterogeneity

Who is (More) Rational?

Figure 1. Mean CCEI scores



Who is (More) Rational?

	(1)	(2)
Constant	.887*** (.022)	.735*** (.037)
Female	-.024*** (.009)	-.011 (.015)
Age		
35-49	-.016 (.011)	-.007 (.020)
50-64	-.052*** (.011)	-.077*** (.020)
65+	-.051** (.020)	-.081** (.032)
Education		
Medium	.009 (.011)	.021 (.017)
High	.026** (.011)	.060*** (.018)
Income		
€500-3499	.026** (.012)	.026 (.019)
€500-4999	.020 (.013)	.006 (.020)
€5000+	.033** (.014)	.017 (.022)
Occupation		
Paid work	.028 (.018)	.030 (.026)
House work	.047** (.021)	.039 (.030)
Others	.037* (.019)	.035 (.030)
Household composition		
Partner	-.026** (.011)	-.023 (.018)
# of children	.001 (.004)	.001 (.007)
R^2	.068	.058

Rationality and Wealth

- Blending of experiment and survey research allows us to study whether *DMQ* under experimental conditions captures *DMA* that applies across many (even real-world) domains.
- We study the correspondence between CCEI in the experiment and wealth in the real world.
- Conditional on income, wealth summarizes innumerable financial decisions involving a host of different tradeoffs (risk, time, self vs. others).
- Predicting wealth/portfolio thus offers a relatively “strong test” for the measure.
- If consistency with utility maximization in the experiment were a good proxy for financial decision-making ability it should help explain patterns of wealth.

CCEI and $\ln(\text{Wealth})$

CCEI	1.351** (0.566)	1.109** (0.534)	101888.0* (52691.9)
Log 2008 household income	0.584*** (0.132)	0.606*** (0.126)	
2008 household income			1.776*** (0.4)
Female	-0.313* (0.177)	-0.356** (0.164)	-32484.3* (17523.9)
Age	-0.303 (0.347)	-0.008 (0.208)	-19148.5 (30164.4)
Age ²	0.007 (0.006)	0.002 (0.004)	468.7 (523.6)
Age ³	0.000 (0.000)	0.000 (0.000)	-2.9 (2.9)
Partnered	0.652*** (0.181)	0.595*** (0.171)	46201.9*** (17173.7)
# of children	0.090 (0.093)	0.109 (0.086)	14078.6* (8351.5)
Education Controls	yes	yes	yes
Occupation Controls	yes	yes	yes
Constant	6.292 (6.419)	0.469 (3.598)	76214.4 (559677.5)
R^2	0.179	0.217	0.188
# of obs.	517	566	568

Is the Correlation Due to Unobserved Constraints?

CCEI	1.322** (0.570)	1.318** (0.574)	1.925*** (0.672)	1.888*** (0.652)	1.441** (0.578)
Log household income					
2008	19.770 (14.629)	1.000 .	0.544*** (0.137)	0.285* (0.165)	0.616*** (0.128)
2008 ²	-2.194 (1.533)				
2008 ³	0.082 (0.053)				
2006				0.232 (0.231)	
2004				0.215 (0.174)	
Demography Controls	yes	yes	yes	yes	yes
Education Controls	yes	yes	yes	yes	no
Occupation Controls	yes	yes	yes	yes	yes
Constant	-47.059 (46.275)	0.864 (6.545)	5.354 (6.93)	3.016 (7.109)	6.398 (6.484)
R^2	0.187		0.205	0.217	0.177
# of obs.	517	517	449	449	517

Unobserved Preferences or Beliefs?

CCEI	1.379** (0.568)	1.396** (0.568)	1.404** (0.569)	1.214* (0.625)	1.237** (0.623)
Risk tolerance					
Quantitative (experiment)	-0.768 (0.714)	-0.808 (0.711)	-0.766 (0.718)		
Qualitative (survey)		0.017 (0.074)	0.023 (0.076)		
Qualitative (survey) missing		-0.190 (0.335)	-0.162 (0.482)		
Stanardized Conscientiousness			0.089 (0.072)		
Conscientiousness missing			-0.040 (0.668)		
Longevity expectations				-0.034 (0.040)	
Log 2008 household income	0.589*** (0.132)	0.578*** (0.131)	0.572*** (0.133)	0.443*** (0.123)	0.434*** (0.123)
Demog, Educ, Occup Controls	yes	yes	yes	yes	yes
Constant	6.840 (6.361)	6.883 (6.357)	6.496 (6.395)	3.777 (15.258)	4.411 (15.256)
R^2	0.179	0.176	0.176	0.163	0.163
# of obs.	517	517	517	414	414

Alternative Proxies for Decision-making Ability

CCEI	1.253*	1.412*	1.328*	1.177**
	(0.712)	(0.724)	(0.725)	(0.583)
CCEI (combined dataset)	0.099			
	-0.38			
von Gaudecker et al. (2011)			0.682	
			(0.489)	
Cognitive Reflection Test (CRT)				0.120*
				(0.071)
CRT missing				-0.203
				(0.237)
Log 2008 household income	0.586***	0.402**	0.399**	0.577***
	(0.132)	(0.156)	(0.155)	(0.132)
Demog, Educ, Occup. Controls	yes	yes	yes	yes
Constant	6.237	8.862	7.583	6.855
	(6.424)	(7.037)	(6.992)	(6.464)
R^2	0.177	0.216	0.219	0.181
# of obs.	517	328	328	517

Other Examples

- CentERpanel on choice over time – basic consistency is key
- LISS on risk – consistency and age and health
- Understanding America Study on risk – complexity and validity across elicitation methods
- American Life Panel on social preferences – voting behaviors
- Survey of medical students – specialization choice
- Survey of Yale Law Students, ALP and undergrads – social preferences

Summary

- Research blends experimental methods and survey research.
- Graphical interface permits rich experimental data collection from relatively large and heterogenous population.
- Proposing that quality \Rightarrow rationality, and measuring it in this way, addresses challenges of decision-making ability literature.
- Observed heterogeneity in rationality and its relationship with observables supports the view that quality \Rightarrow rationality.
- Motivates further work