

Smart Money: The Effect of Education, Cognitive Ability, and Financial Literacy on Financial Market Participation

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Overview of Comments

- Brief review of “Smart Money” paper
- Results from several recent field experiments
- Implications for Policy and Future Research

Preview: Smart Money

- Does education cause financial market participation?
 - Provide precise, causal estimates
 - Instruments based on changes in compulsory schooling laws
 - Education has a large positive effect on participation
- What are the mechanisms?
 - Financial literacy education in high school
 - Does not appear to have an effect
 - Cognitive ability
 - Innate and acquired abilities both matter
 - Other mechanisms
 - Borrowing behavior, peer effects, feeling in control

Education

Census Data

The 2000 US Census “Long Form” (IPUMS)

- Outcome variables
 - Investment income: “Income from interest, dividends, net rental income, royalty income, or income from estates and trusts—report even small amounts credited to an account.”
 - Income from retirement savings: “Retirement, survivor or disability pensions (does not include Social Security)”
- Other data: year and place of birth, state of residence, education, earned income
- Sample:
 - Individuals aged 36 - 75
 - Drop top-coded individuals
 - Investment income above \$50,000
 - Retirement income above \$52,000

Education

Empirical Strategy

- Use changes in state compulsory schooling laws as instruments
 - Acemoglu and Angrist (2000), Lochner and Moretti (2004)
 - Determine years of mandated schooling

$$y_i = \beta \text{schooling}_i + \gamma X_i + \varepsilon_i$$

- First stage

$$\text{schooling}_i = \alpha + \delta_9 \text{CA9}_i + \delta_{10} \text{CA10}_i + \delta_{11} \text{CA11}_i + X_i + \varepsilon_i$$

- $\text{CA}\#$ = mandated # years of schooling when i turns 14
- Control for state of birth and decade of birth fixed effects
- Also for age, gender, state of residence, earned income
- Dependent variable “investment income” from census

Education

Instrumental Variables First Stage Estimates

Table II
Estimates of the Effect of Compulsory Schooling Laws on Education

	Years of schooling (1)	High school (2)
Compulsory Attendance = 9	0.208 *** (0.018)	0.038 *** (0.003)
Compulsory Attendance = 10	0.194 *** (0.023)	0.040 *** (0.004)
Compulsory Attendance = 11	0.259 *** (0.027)	0.055 *** (0.005)
Num of Observations	17,033,260	17,033,260
R-Squared	0.231	0.178

Education

Instrumental Variable Results

Table III
2SLS Estimates of the Effect of Schooling

Panel A: Any Investment Income

Years of schooling	7.59 *** (0.51)
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Num of Observations	14,727,879
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F-stat of excluded instruments	47.0
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Panel B: Amount of Investment Income

Years of schooling	1767.49 *** (128.66)
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Num of Observations	14,655,392
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F-stat of excluded instruments	46.9
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Financial Literacy

Identification Problem

- Financial literacy: understanding of interest rates, etc.
- Evidence that people with greater financial literacy save more
- Policy makers have focused on high school courses
 - Significant selection problem
 - Students with weak background may sign up (negative bias)
 - Richer schools may be offer courses (positive bias)
 - Evidence is mixed

Financial Literacy

Bernheim, Garret, and Maki: Findings

- BGM find those exposed to mandate:
 - Were more likely to have taken a financial literacy course
 - Had higher savings rate (4 percentage points in distribution)
- (Almost) only causal evidence in favor of financial literacy education
- But:
 - Treatment states are not randomly assigned
 - Limited power to check for pre-existing trends
 - Arbitrary specification

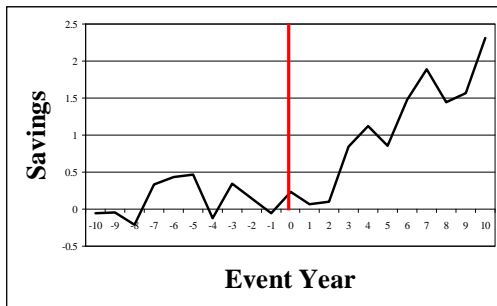
Financial Literacy

- We use census data to replicate BGM's results
 - Much larger sample size (3m vs. 3,000)
- Much more flexible specification allowing check of identification strategy

Financial Literacy

New Specification

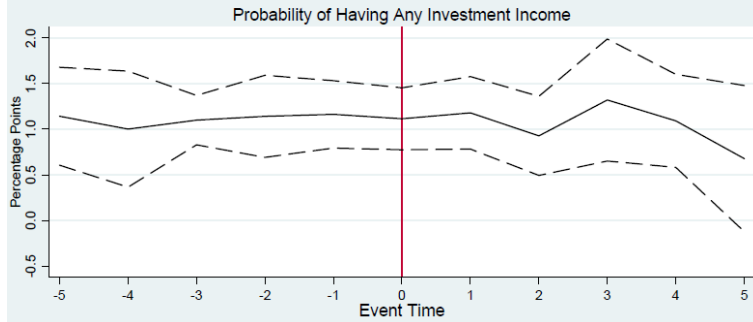
- If the experiment is valid, we should expect to see a relationship like this (fabricated data):



Financial Literacy

Results

Figure 2. Financial Literacy Education and Saving



Financial Literacy

Results

- Why do our results differ?
 - Not due to differences in the data

Table IV
BGM Results and Replication Using Census Data

	BGM Results	Census Estimates	
	Savings Percentile (1)	Any Investment Income (2)	Investment Income (5)
Years since mandate	0.80 ** (0.35)	0.33 *** (0.06)	18.95 *** (3.77)
State ever imposed mandate	-1.25 (1.59)	-1.90 *** (0.38)	-122.93 *** (22.50)
R-squared		0.11	0.01
Number of Observations	1,869	3,601,777	3,579,595

Financial Literacy

Conclusion

- How to explain discrepancy?
 - State GDP growth and law passage are correlated
 - Mandates enacted during periods of high growth
- We conclude that financial literacy education mandates in high schools do not appear to affect savings behavior
- (We do not prove that financial literacy does not matter)

Cognitive Ability and Personality

- Cognitive ability matters for financial decision making
- Standard identification problems: measured cognitive ability associated with parental income, education, which may in turn affect financial decisions
- Use within-family analysis to control for family background (following Benjamin & Shapiro 2006)
 - Use National Longitudinal Survey of Youth (NLSY)
 - Some 'abilities' are acquired in school
 - Divide test scores into acquired and innate
 - Find significant effect of both on various asset types
 - Exploit genetic variation in measured cognitive ability

Cognitive Ability

Empirical Specification

$$y_{it} = \beta ability_i + \delta education_i + \gamma X_{it} + SG_i + \varepsilon_{it}$$

- y_{it} : participation in different asset classes
- $ability_i$: percentile score in the Armed Services Vocational Aptitude Battery (ASVAB)
- $education_i$: highest grade completed
- X_{it} : age, gender, survey year fixed effects
 - Proxy for permanent income with $\log(\text{income})$ in every year
- SG_i : sibling group fixed effect (sample includes only sibling groups)
- Standard errors are clustered by individual

Cognitive Ability

Results

Table VII
Estimates of the Effect of Knowledge and Ability on Savings, NLSY

Dependent Variable: Any \$ in Asset	Money Left	Stocks, Bonds & Mutual Funds	Savings	Income from Other Sources (Interest, Rent, Dividends, etc.)
Years	1990 - 2004 (1)	1988 - 2000 (2)	1985 - 2000 (3)	1988 - 2000 (4)
Panel A: Any Investment Income				
Knowledge	2.559 ** (1.287)	3.390 *** (1.134)	1.073 (0.935)	5.317 *** (0.907)
Ability	3.632 *** (1.226)	1.832 * (0.942)	5.183 *** (0.938)	4.092 *** (0.844)
Years of Education	0.173 (0.372)	1.508 *** (0.329)	1.653 *** (0.256)	1.477 *** (0.225)
Num of Observations	25993	34663	44006	76372
R-Squared	0.38	0.33	0.42	0.39
F-stat of Knowledge & Ability	0.00	0.00	0.00	0.00

- Knowledge associated with money left, stocks and bonds; and income from other sources

Personality

- Feeling in control over life

"I have little control over the things that happen to me"

Table IX
Estimates of the Effect of Not Feeling in Control on Savings, NLSY

Dependent Variable:	Money Left	Stocks, Bonds & Mutual Funds	Savings	Income from Other Sources (Interest, Rent, Dividends, etc.)
	(1)	(2)	(3)	(4)
Panel A: Any Money				
Little Control	-2.82 *** (0.95)	0.01 (0.79)	-2.09 ** (0.89)	-1.44 * (0.77)
Num of Observations	21,229	21,261	17,593	24,503
R-Squared	0.41	0.38	0.49	0.45

Other mechanisms

- One additional year of education
 - Increases probability you will be employed in an industry that offers its workers pensions
 - Increases the probability you will live in a neighborhood with neighbors who have pensions
 - Reduces the probability of a second mortgage
 - Increases reported self-control

Conclusion

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- Education increases savings by 8% per year of schooling
- High school financial literacy training does not seem to explain this effect
- Cognitive ability increases savings
 - Both innate and acquired abilities matter
- Other potential mechanisms
 - Feeling in control increases savings and is correlated with education
 - Education leads to different peers, more patience

Mechanisms: An 8 percentage point effect in comparison

- Duflo and Saez invitation to TDA fairs: 1.25 percentage points
- Duflo and Saez 50% contribution match: 14 percentage points
- Beshears et. al. Changing Default: 35 percentage points

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- Effect Size (how one s.d. change in X moves a changes in Y s.d.)

Item	Effect Size
Education	19.8%
Trust (Guiso, Sapienza, Zingales)	4%
Peer Effects (Hong and Stein)	1.15%

Developing Countries Evidence

- Cole, Thompson, Zia (2010): Field Experiment in Indonesia
- Karlan and Valdivia (2010): Training Entrepreneurs
- Guarav, Cole, and Tobacman (2010): Financial Education and Rainfall Insurance

Prices or Knowledge: Financial Education in Indonesia

- Strong correlation between financial literacy and financial behavior in nationwide sample
- Study sample: 564 individuals without bank accounts, nationally representative
- Treatment A: Three hour Financial Literacy Education (50%) or not (50%)
- Treatment B: Incentive to open an account: Low (\$3) / Medium (\$8) / High (\$14)
- Outcome: does individual open bank account within two months
- Financial literacy education: ineffective overall, small effect on uneducated
- Price impact: small incentives dramatically increase use of bank accounts

Karlan and Valdivia: Training Entrepreneurs

- Randomized Evaluation of 3,500 MFI borrowers in Peru
- Treatment is 30-60 minute business training module, weekly, over 1-2 years
- Adopt some lessons; small, positive effect on revenues, greater client retention
- Many other hoped-for effects did not materialize
- Lower perceived demand from those for whom program most effective
- (Not cost-effective)

Guarav, Cole, and Tobacman: Financial Education and Rainfall Insurance

- Sample: 600 potential purchasers of rainfall insurance in Gujarat, India
- Intervention: financial literacy training explaining rainfall insurance
- Outcome measure: decision to purchase
- Results: education module increases take-up by 5 percentage points
- Subtler messages have weak effect
- Intervention would not be cost-effective for private insurer

Final Conclusions

- Financial decisions are difficult
 - We teach discounting to Harvard MBAs
- Capacity to deliver high-quality interventions limited in emerging markets
- Messages are nuanced, not uniform (sometimes borrowing from moneylender may make sense)
- Changing prices has much bigger effect, and is much more cost-effective
- Providers may stay one step ahead of educator / regulator
- Global effort to promote financial literacy should focus first and foremost on developing effective programs, full stop. Only then should general programs be supported