

Financial Literacy and Savings Account Returns

Florian Deuflhard

Goethe University, Frankfurt

Dimitris Georgarakos

Goethe University, Frankfurt and University of Leicester

Roman Inderst

Goethe University, Frankfurt and Imperial College

NETSPAR International Pension Workshop

Amsterdam, January 28-30, 2015

Motivation

Savings accounts

- held by the vast majority of households
- make up for the largest fraction of financial wealth
- seemingly '**simple**' financial products

but:

- wide dispersion of interest rates even for the same volume
- existence of products with various features

Research Question

Does observed interest rate dispersion merely reflect differences in account features or can it also be explained by investor capabilities, such as financial literacy?

- Shed light on the mechanism through which financial literacy plays a role
- Evaluate the potential wealth losses from limited literacy

Background

Lusardi and Mitchell (*JME*, 2007): high literacy households are better **prepared for retirement**

van Rooij, Lusardi and Alessie (*JFE*, 2011): high literacy households more likely to invest in **stocks**

van Rooij, Lusardi and Alessie (*EJ*, 2012): high literacy households **accumulate more wealth**

Background (contd.)

...but limited evidence on the links between financial literacy and **asset returns**

Calvet, Campbell and Sodini (*JPE*, 2007): more educated/ higher income households hold better diversified portfolios

Clark, Lusardi and Mitchell (2014): more financially knowledgeable employees invest more profitably in 401(K) plans

Key findings (preview)

- Significant dispersion in the balance-weighted APR of saving accounts held by households
- Financial literacy matters for the interest earned, *net of*: socio-economic characteristics; account features; and bank fixed effects
- Channels:
 - Familiarity with modern technology (online accounts)
 - shopping for best terms across banks
- Non-trivial implied welfare losses

Data Sources I: DNB Household Survey + Financial Literacy Module

- Nationally representative survey of around 2,000 Dutch households
- Time frame: 2005 (later extended to 2008)
- Demographic characteristics; Financial/ Real Wealth, Debt, and Income; Investment attitudes
- **Financial literacy module** for random sub-sample in 2005 (van Rooij et al. 2011)
 - advanced financial knowledge: properties of stocks, bonds, and mutual funds, the relationship between bonds and interest rates as well as risk diversification (10 questions – factor analysis)

Data Sources II: DNB Household Survey, Savings Accounts

- Detailed information on *each* savings account:
 - Ownership: single, joint, third party owned
 - Account volume (as of December 31st of previous calendar year)
 - Account name (from CentERdata)
 - Bank name (from CentERdata)

Data Sources III: Interest Rate Data from a large Dutch bank

- Annualized interest rates for savings accounts of all Dutch banks
- Time frame: April 2004 to December 2007 (weekly frequency)
- Interest rate variation across *three* dimensions:
 - Banks (ABN Amro; Postbank; Rabobank; ING; Fortis; SNS Bank; and 43 smaller banks)
 - Account names (149)
 - Eleven volume brackets, from €450 to €45,000

Data Sources IV: Account characteristics from Dutch comparison website

- Minimum amount
- Lowest balance bonus
- Balance growth bonus
- Limited Withdrawal
- Linked to salary account
- Additional fees

- Distinguish *Internet managed* accounts

Matching procedure

Account-Level Matching

- Based on: *account name, invested volume, bank name*
- Match interest rate as of last week of December 2004
- Matching success rate: 80% of all accounts in DHS 2005
- Assign non-matched cases based on reported bank information
- Repeat matching process for later years (i.e. 2006 to 2008)

➤ ***Balance-weighted APR per household***

EXAMPLE OF A MULTI-BANK HOUSEHOLD IN THE DHS

HID	PID	AccID	Year	Bank	Product Name	Volume	Weight
13214	1	1	2005	SNS Bank	telespaarrekening	12,750	0.46
13214	1	2	2005	Rabobank	rabo rendementrekening	500	0.02
13214	2	1	2005	Rabobank	rabo rendementrekening	900	0.03
13214	2	2	2005	ING Bank	internetspaarrekening	13,800	0.49

EXAMPLE OF A MULTI-BANK HOUSEHOLD IN THE MATCHED DHS

HID	PID	AccID	Year	Bank	Product Name	Volume	Weight	APR	Weighted APR
13214	1	1	2005	SNS Bank	telespaarrekening	12,750	0.46	2.40	2.70
13214	1	2	2005	Rabobank	rabo rendementrekening	500	0.02	1.55	2.70
13214	2	1	2005	Rabobank	rabo rendementrekening	900	0.03	1.55	2.70
13214	2	2	2005	ING Bank	internetspaarrekening	13,800	0.49	3.10	2.70

SUMMARY STATISTICS HOUSEHOLD-LEVEL VARIABLES FOR 2005

	Mean	Std. Dev.	25th pct.	Median	75th pct.	N
Balance-weighted APR	2.37	0.77	1.60	2.50	3.00	888
Number of accounts	1.84	1.17	1.00	2.00	2.00	888
Total savings account volume	18,679	42,312	1,429	6,741	20,433	888

~ 30% of households: accounts in >1 banks

BALANCE SHEET OF DUTCH HOUSEHOLDS IN 2005

Asset Category	Ownership Rate	Asset Ratio <i>in % of financial wealth</i>
Checking accounts	95.8%	21.2%
Savings / deposit acc.	82.4%	42.9%
Deposit books	7.5%	2.3%
Savings certificates	2.1%	0.4%
Bonds	4.6%	1.0%
Stocks	12.3%	3.1%
Funds	20.4%	5.9%
Options	1.2%	0.1%
Empl.-spons. savings plan	38.4%	8.4%
Insurances	30.8%	11.6%
Other financial wealth	11.8%	3.1%
		<i>in % of total wealth</i>
Financial wealth	97.0%	42.5%
Home equity and other real estate	49.7%	47.1%
Business equity	3.4%	1.4%
Durables	77.1%	14.4%

Possible mechanisms (net of account characteristics)

(a) ‘Shop’ across banks for the best interest rate

(b) *Even at a given bank*, households may not choose the most preferable account for the amount that they save

> typically Internet managed accounts earn the highest interest

(c) *Even for a given set of own saving accounts*, households may be better off by concentrating all their savings into the account that earns the highest interest

Empirical specification I (*baseline*)

Account-level regression (implicitly assumes one account per household)

$$r_{hs} = \beta_1 FinLit_h + \beta_2 X_h + \beta_3 V_{hs} + \beta_4 Z_s + \varepsilon_{hs}$$

- r_{hs} - APR
- $FinLit_h$ - advanced literacy index (normalized)
- X_h - age; gender; marital status; children; education; occupation status; region of residence; net income
- V_{hs} - (ten) volume dummies
- Z_s - account characteristics; bank fixed effects

Empirical specification II

Household-level regression

$$r_h = \beta_1 FinLit_h + \beta_2 X_h + \beta_3 W_h + \beta_4 Z_h + \varepsilon_h$$

- r_h - weighted APR
- $FinLit_h$ - advanced literacy index (normalized)
- X_h - age; gender; marital status; children; education; occupation status; region fe
- W_h - Quartiles: net income; savings wealth; net (other) financial wealth; net real wealth
- Z_h - account characteristics; bank fixed effects

Identification

- (actual) APR: quite unlikely to correlate with literacy through household unobserved factors (e.g., knowledge about realized returns or reporting bias)
- Literacy index is measured with error (some responses are due to guessing)
 - Estimated effects on literacy *downward biased*
- IV estimates larger magnitudes than OLS – comparable to magnitudes derived when used quartiles of literacy
- Heteroscedasticity-based identification, Lewbel, *JBES*, 2012
 - generated instruments (product of age, gender, family size with first-stage residuals)
 - comparable results with IV / both internal instruments valid

Instruments

Instrument 1: financial experience of the oldest sibling (van Rooij et al., *JFE* 2011)

- learning channel through which respondents tend to become more literate from the negative experiences of their siblings (consistent with the negative correlation in first stage regression).

Instrument 2: economics education of the respondent at school (van Rooij et al., *EJ* 2012)

- controlling for *contemporaneous* net financial and net real wealth (most likely channel through which past economics education can influence current investment choices)

OLS OF PRODUCT LEVEL APR ON FINANCIAL LITERACY IN 2005

	OLS (1)		IV (1)		OLS (2)		IV (2)	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Advanced Financial Literacy	0.110***	0.031	0.275**	0.136	0.108***	0.023	0.318***	0.112
HH Socio-economic characteristics	Yes		Yes		Yes		Yes	
Volume threshold dummies	Yes		Yes		Yes		Yes	
<i>Account characteristics</i>								
Minimum amount					0.036	0.084	0.009	0.089
Lowest balance bonus					0.216**	0.096	0.202**	0.102
Balance growth bonus					1.732***	0.103	1.773***	0.114
Limited withdrawal					1.428***	0.072	1.386***	0.092
Additional fees					-0.246***	0.059	-0.300***	0.065
Salary account					0.968***	0.123	0.936***	0.121
Joint ownership					-0.031	0.048	-0.005	0.050
Third party ownership					-0.022	0.060	0.032	0.071
Bank fixed effects	No		No		Yes		Yes	
<i>N</i>	1,575		1,471		1,572		1,468	
Adjusted R-squared	0.09		0.07		0.46		0.42	
Hansen J-test p-value			0.78				0.68	
F-statistic first stage			9.22				9.93	
Exogeneity test p-value			0.24				0.06	

OLS OF WEIGHTED APR ON FINANCIAL LITERACY IN 2005

	OLS (1)		IV (1)		OLS (2)		IV (2)	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Advanced Financial Literacy	0.108***	0.030	0.285**	0.132	0.105***	0.025	0.329***	0.116
HH Socio-economic characteristics	Yes		Yes		Yes		Yes	
Account characteristics	No		No		Yes		Yes	
Bank fixed effects	No		No		Yes		Yes	
<i>N</i>	888		828		885		826	
Adjusted R-squared	0.12		0.08		0.41		0.34	
Hansen J-test p-value			0.51				0.21	
F-statistic first stage			10.42				10.09	
Exogeneity test p-value			0.14				0.04	

Other covariates

- Age ; amount invested in savings accounts (significant)
- Family size, employments status; gender, education; other net *financial* and net real wealth (insignificant)

Panel A: Household level

	OLS		IV	
	Estimate	SE	Estimate	SE
Advanced Financial Literacy	0.074***	0.020	0.224**	0.091
Internet account	0.919***	0.040	0.906***	0.043
Demographics and other controls	yes		yes	
Account characteristics	yes		yes	
Bank fixed effects	yes		yes	
<i>N</i>	885		826	
Adjusted R-squared	0.67		0.64	
Hansen J-test p-value			0.46	
F-statistic first stage			10.03	
Exogeneity test p-value			0.07	

Panel B: Product level

	OLS		IV	
	Estimate	SE	Estimate	SE
Advanced Financial Literacy	0.060***	0.013	0.238***	0.069
Internet account	1.297***	0.032	1.275***	0.035
Demographics and other controls	yes		yes	
Account characteristics	yes		yes	
Bank fixed effects	yes		yes	
<i>N</i>	1,572		1,468	
Adjusted R-squared	0.81		0.78	
Hansen J-test p-value			0.92	
F-statistic first stage			9.93	
Exogeneity test p-value			0.00	

Robustness

- Comparable IV estimates when estimating more parsimonious specifications (excl. income, savings volume, financial and real wealth)
- Categorical change in financial literacy (quartiles)
- Categorical change in weighted APR (quartiles)
- Categorical change in weighted APR (quartiles) and financial literacy (quartiles)
- Pooled regression 2005-2008
- Controls for: risk aversion; income shocks in last year; hours worked
- Restrict the sample to financial respondents

ESTIMATED WEALTH LOSSES DUE TO LOW LITERACY

Yearly interest rate benefit in %	0.43%
Yearly interest rate benefit absolute	€ 75.75
Cumulative interest rate benefit over 10 years	€ 947.24
Cumulative interest rate benefit over 10 years in % of initial amount	5.37%
Cumulative interest rate benefit over 10 years in % of median net income	4.05%

BANK SWITCHING BETWEEN ADJACENT PERIODS 2005-2008

	2005	2006	2007	2008
No Switch	94.15	94.71	93.93	91.10
Switch	5.85	5.29	6.07	8.90
Total	100.00	100.00	100.00	100.00
N	882	939	974	931

Conclusions

- Significant dispersion in the balance-weighted APR of saving accounts held by households (Q3-Q1: 140 bp)
- Financial literacy matters for the interest earned, after taking into account socio-economic characteristics; account features; and bank fix effects (~33bp)
 - Familiarity with modern technology (online accounts) is one channel through which literacy associates positively with earned interest (shopping for best terms across banks turns out to play a role too).
- Only a small fraction of households switches accounts over time (2005-2008: ~6.5%)
- Non-trivial implied welfare losses

Implications

- Understand household heterogeneity in seemingly ‘simple’ and widely held financial assets
- Heterogeneity in returns of ‘safe’ assets (?)
- Effectiveness of financial education programs:
 - acquired knowledge can be immediately applicable
 - understanding all possible channels through which financial literacy is likely to affect household investments

Implications (contd.)

- How retail investors deal with complexity in financial markets: transparency rules in the optimal disclosure of financial product information
- An example of combining information from a population survey (used as a base) and administrative data
 - May worth extending to countries with *less competitive* financial markets/ *less literate* households

Thank you!

For comments or questions, please send me an email:

georgarakos@hof.uni-frankfurt.de

Financial Literacy (Advanced)

(1) Which statement describes the main function of the stock market? (i) The stock market helps to predict stock earnings; (ii) the stock market results in an increase in the price of stocks; (iii) the stock market brings people who want to buy stocks together with those who want to sell stocks; (iv) none of the above; (v) do not know; (vi) refusal.

(2) What happens if somebody buys the stock of firm B in the stock market? (i) He owns a part of firm B; (ii) he has lent money to firm B; (iii) he is liable for firm B debt; (iv) none of the above; (v) do not know; (vi) refusal.

(3) Which statement about mutual funds is correct? (i) Once one invests in a mutual fund, one cannot withdraw the money in the first year; (ii) mutual funds can invest in several assets, for example, invest in both stocks and bonds; (iii) mutual funds pay a guaranteed rate of return which depends on their past performance; (iv) none of the above; (v) do not know; (vi) refusal.

(4) What happens if somebody buys a bond of firm B? (i) He owns a part of firm B; (ii) he has lent money to firm B; (iii) he is liable for firm B's debts; (iv) none of the above; (v) do not know; (vi) refusal.

(5) Considering a long time period (e.g. 10 or 20 years), which asset normally gives the highest return? (i) Savings accounts; (ii) bonds; (iii) stocks; (iv) do not know; (v) refusal. (11) Normally, which asset displays the highest fluctuations over time? (i) Savings accounts; (ii) bonds; (iii) stocks; (iv) do not know; (v) refusal.

(6) When an investor spreads his money among different assets, does the risk of losing money (i) increase; (ii) decrease; (iii) stay the same; (iv) do not know; (v) refusal.

(7) If you buy a 10-year bond, it means you cannot sell it after five years without incurring a major penalty. (i) True; (ii) false; (iii) do not know; (iv) refusal.

(8) Stocks are normally riskier than bonds. (i) True; (ii) false; (iii) do not know; (iv) refusal.

(9) Buying a company fund usually provides a safer return than a stock mutual fund. (i) True; (ii) false; (iii) do not know; (iv) refusal.

(10) If the interest rate falls, what should happen to bond prices? (i) Rise; (ii) fall; (iii) stay the same; (iv) none of the above; (v) do not know; (vi) refusal.

Advanced Financial Literacy: some facts

< 5% answers all the advanced literacy questions correctly

<50% know that a stock mutual fund is safer than a company stock

<50% are correct about which asset (among savings accounts, bonds, and stocks) gives the highest return over the long term

~25% know about bond pricing/ ~30% know how long-term bonds work

Age	
18-30 years	2.64
31-40 years	2.36
41-50 years	2.28
51-60 years	2.36
61 years and older	2.33
Married	
Single-Person Households	2.32
Two-Person Households	2.40
Savings Wealth Quartiles	
1(low)	2.07
2	2.20
3	2.44
4(high)	2.59
Advanced Literacy Quartiles	
1(low)	2.19
2	2.31
3	2.45
4(high)	2.53