

Financial Literacy and Interviewer Effects

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Motivation - Financial Literacy an Important Concept

- Understanding **Households' finances** and their decisions has become **increasingly important**
- Recent research has highlighted **limitations of households' financial decisions**
- Literature argues that **poor financial literacy affects in a causal way** the formation of **suboptimal financial choices**, e.g. with respect to retirement saving, debt behaviour, choice of saving and current accounts,...

Motivation – Financial Literacy Specifically Prone to Measurement Error?

- Much of knowledge on effects of financial literacy is based on **survey data**
- **Measurement error** arising from the survey response process is an important concern (Browning et al., 2014; Lusardi and Mitchell, 2014)
- **Interviewers** are an important **source of measurement error**, as they affect unit nonresponse, item nonresponse, and the response itself
- Our interest is in **how interviewer effects play** out in the measurement of a substantively important construct - financial literacy.
- **This application is particularly interesting in that the interviewer knows the correct answers to the literacy questions.**

Research Questions

- Are **responses** to financial literacy questions affected by the interviewer?
- Which are **appropriate strategies to reduce or correct for interviewer effects** in regression models that include financial literacy as a right-hand side variable?

A Framework for Thinking about Interviewer Effects: A Model of Response

$$FL_{ij} = \beta + v_i + \pi_j \omega_i + u_j$$

- FL_{ij} is a measure of the variable we are interested in (financial literacy), with true value $FL_{ij}^* = \beta + v_i$
- The overall mean of true financial literacy is given by β , and heterogeneity in the true value given by v_i
- **Response error** is $\pi_j \omega_i + u_j$: with u_j interviewer level error and ω_i individual reporting error
- π_j allows for an impact of interviewers on the individual reporting error:
 $\pi_j < 1$ for interviewers who (e.g., through more patience) reduce respondent error
- We assume that π_j , ω_i , v_i and u_j are independent.

A Framework for Thinking about Interviewer Effects: Model Implications

It is straightforward to show that

$$1) V[FL_{ij}] = \sigma_u^2 + \sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2)\sigma_\omega^2 \quad \text{where } \mu_\pi^2 = (E[\pi_j])^2$$

$$2) V[FL_{ij} - E[FL_{ij}|j]] = V[v_i + \pi_j\omega_i] = \sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2)\sigma_\omega^2$$

so that the intraclass (i.e., within interviewer) correlation (ICC) is:

$$\frac{\sigma_u^2}{\sigma_u^2 + \sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2)\sigma_\omega^2}$$

and

$$(1 - ICC) = \frac{\sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2)\sigma_\omega^2}{\sigma_u^2 + \sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2)\sigma_\omega^2}$$

The empirical magnitude of these quantities can be obtained from analysis of variance or the simplest hierarchical/mixed model.

A Framework for Thinking about Interviewer Effects: Implications

The ICC can be used to improve the estimate of the effect of Financial Literacy on an outcome y

Suppose the equation of interest is $y_{ij} = \alpha FL_{ij}^* + e_{ij}$

Substituting measured FL for true FL gives $y_{ij} = \alpha (FL_{ij} - \pi_j \omega_i - u_j) + e_{ij}$

=> usual measurement error problem: independent variable correlated with components of the error

=> Coefficient estimate from an OLS $\hat{\alpha}$ is attenuated
$$plim \hat{\alpha} = \alpha \frac{\sigma_v^2}{\sigma_u^2 + \sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2) \sigma_\omega^2}$$

Rescaling $\hat{\alpha}$ by the ICC improves estimate
$$plim \frac{\hat{\alpha}}{1-ICC} = \alpha \frac{\sigma_v^2}{\sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2) \sigma_\omega^2}$$

because
$$\frac{\sigma_v^2}{\sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2) \sigma_\omega^2} > \frac{\sigma_v^2}{\sigma_u^2 + \sigma_v^2 + (\sigma_\pi^2 + \mu_\pi^2) \sigma_\omega^2}$$

A similar result can be obtained by a within transformation (e.g. fixed effects)

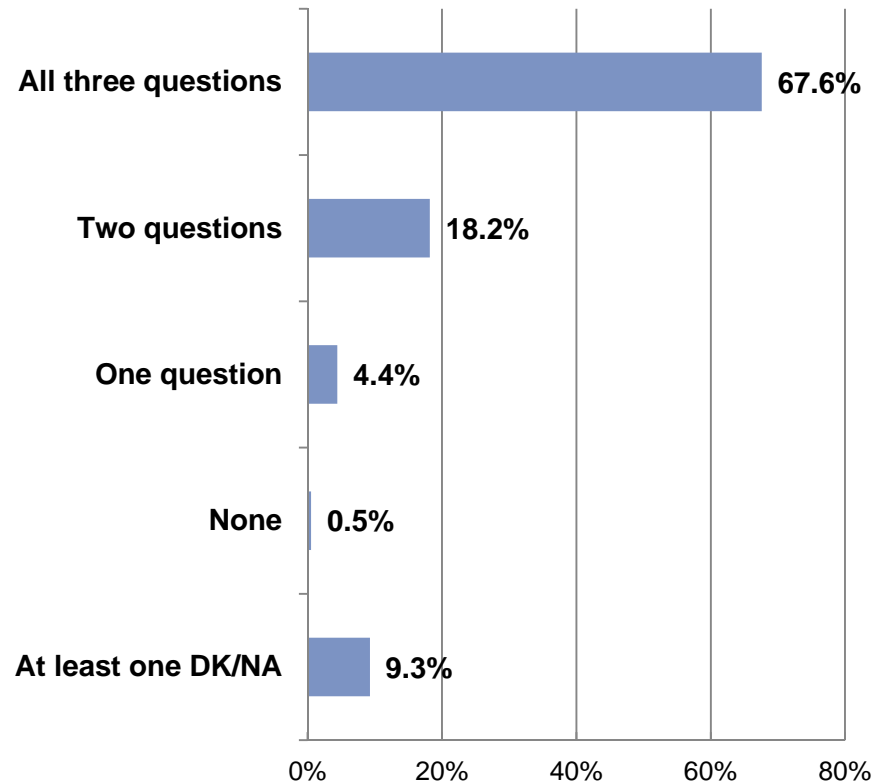
Data Source and Key Variables

- German Wealth Survey **2010** : “**Panel on Household Finance (PHF)**”
 - 1,735 households interviewed by 175 interviewers (part 1 of 2010 survey)

 - Three **financial literacy questions** (Lusardi and Mitchell, 2009)
 - interest rate
 - effects of inflation
 - diversification
- => Financial **literacy score**: binary, **all three correct**/ one or more **wrong or missing**

Descriptive Statistics - Literacy Questions

Number of correctly answered financial literacy questions



- 67.6 % get all three questions right
- 9.3 % with missing value for at least one question

Decomposition of Variance - Financial Literacy Indicators

- **Interviewer** fixed effects explain a **large fraction of variance**
- Interviewer effects **larger for financial literacy questions** than for other questions
- **Interviewer characteristics** (jointly) significant in explaining literacy score

ICCs from unweighted Random Effects GLS-Regression

	Financial literacy score	FL1 : Interest	FL2: Inflation	FL3: Diversification	Life Satisfaction	Total household net income	Inflation expect.
(a) Interviewer Random Effects only	17.7%	16.8%	20.1%	7.7%	2.8%	0.8%	9.7%
(b) Household Characteristics + Interviewer Random Effects	17.7%	14.7%	17.1%	7.0%	0.0%	0.0%	8.5%

(b) Individual/HH Characteristics included: RP: born in Germany (dummy), RP: female (dummy), RP: Age (<35, 35-44, 45-54, 54-64, 65+), RP: Employment (1 gainfully employed, 2 self-employed, 3 other), RP: Education (1-low, 2-medium, 3-high), HH: gross household income (quantiles), HH-Size (1, 2, 3, 4+)

The Influence of Interviewers on Reporting by Respondents

Recall Model: $FL_{ij} = \beta + v_i + \pi_j \omega_i + u_j$

Is $\pi_j = 1$? No, it is not

F-Tests for equality of variances of residuals (e) within interviewers (p-values)

	Financial literacy score	FL1 : Interest	FL2: Inflation	FL3: Diversification
P-value for Brown and Forsythe's F statistics (trimmed mean)	<0.0001	<0.0001	<0.0001	<0.0001
P-value for Brown and Forsythe's F statistic (median)	0.00128	<0.0001	<0.0001	0.00061
P-value for Leven's F-statistic	<0.0001	<0.0001	<0.0001	<0.0001

Correcting for Interviewer Effects in Substantive Regressions

- Estimate **models of savings account, stock and mutual funds ownership** with and without interviewer fixed effects

Coefficients on Financial Literacy

Dependent Variable	Baseline : FL + indiv/hh characteristics	FL + indiv/hh characteristics + int. fixed effects	correction FL=FL*(1/(1-ICC)) ICC: 0.177
has saving accounts	0.064 **	0.082***	0.078
has mutual funds	0.113***	0.093***	0.137
has shares	0.043*	0.029	0.052

Notes: Regressions include Individual/HH Characteristics included: RP: born in Germany (dummy), RP: female (dummy), RP: Age (<35, 35-44, 45-54, 54-64, 65+), RP: Employment (1 gainfully employed, 2 self-employed, 3 other), RP: Education (1-low, 2-medium, 3-high), HH: gross household income (quintiles), HH-Size (1, 2, 3, 4+)

The difference between the estimates and the ICC -corrected coefficients varies across the outcomes under study (y_{ij}). This implies that the outcomes may also be affected by measurement error.

Summary, Conclusions and Future Research

- **Interviewer effects explain** a large fraction of **variance in financial literacy** questions, presumably because the interviewer knows the correct answer
- Despite the **large interviewer effects**, they **don't seem to affect substantive estimates too much**.
- Releasing intra-class-correlations within interviewers for key variables, including financial literacy, could be feasible for survey administrators and would help data users.



Thank you for your attention !

Descriptive Statistics – Interviewer Characteristics

		Frequency	Percentage
Interviewers' education	Low (Volks-/Hauptschulabschluss)	21	12.0
	Medium (Mittlere Reife)	63	36.0
	High (Fachhochschulreife, Abitur, Hochschule)	91	52.0
Interviewers' gender	female	67	38.3
	male	108	61.7
Interviewers' age group	18 to 44	22	12.6
	45-54	49	28.0
	55-64	70	40.0
	65+	34	19.4