

# Fearless Girl!

## Women, confidence, and financial literacy

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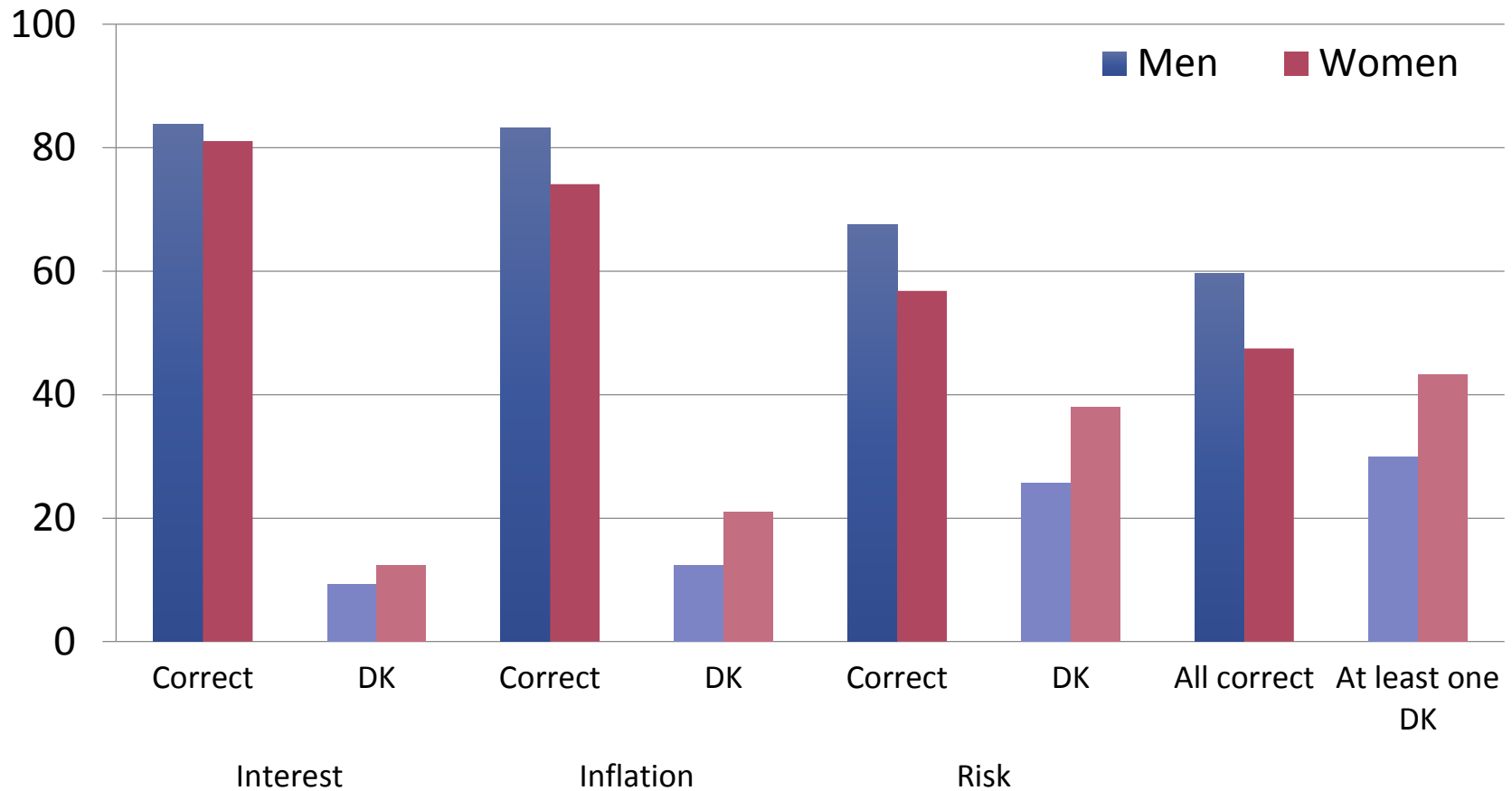
# The Role of Financial Literacy

## Financial literacy around the world (FlatWorld)

- International effort to compare levels of financial literacy around the world based on a consistent set of questions.
- Participating countries
  - **Germany, Netherlands, US, Sweden, Italy, New Zealand, Japan, and Russia**
  - Bucher-Koenen and Lusardi (2011), “Financial literacy and retirement planning in Germany”, *Journal of Pension Economics and Finance*
- Central finding: Systematic patterns emerge - some groups with significantly lower levels of financial literacy
  - Individuals with low education and income
  - Relatively young/old individuals
  - Women

# Financial Literacy – The “Big 3”

## Germany



Bucher-Koenen, Lusardi, Alessie, van Rooij (2017) “How financially literate are women? An overview and new insights”, *Journal of Consumer Affairs*

# Stylized Facts

Insights from the existing literature

- There is a substantial **gender gap** in financial literacy.
- Women answer “**do not know**” much more frequently.
- The gender gap is persistent in **many countries, subgroups, knowledge domains.**

Bucher-Koenen, Lusardi, Alessie, van Rooij (2017) „How financially literate are women? An overview and new insights“, *Journal of Consumer Affairs*

- Issue still of extremely high relevance – **policy and academic**

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**Warum wir zu wenig über Finanzen wissen - und was sich ändern muss**

Wenn 9800 Frauen über Geld debattieren

Zu kompliziert, zu langweilig, zu unsicher: Frauen sparen weniger als Männer. Bloggerinnen wollen das ändern

Wenn ich einmal reich wär

Zeit für einen Kassensturz: Wie viel Geld haben Sie j wird es sein, wenn Sie in Rente sind? Arm im Alter verhindern: Wenn wir anfangen, anders mit Geld umschmierern)

# Related (selected) Literature

Gender and financial literacy matter for financial decisions

## **Women...**

- ... own fewer bank accounts world wide (World Bank 2013).
- ... own fewer assets (Lusardi and Mitchell 2008).
- ... invest less in risky assets (Almenberg and Dreber 2015, Sunden and Surette 1998).
- ... have less access to credit (Alesina et al. 2013).

## **Individuals with low financial literacy...**

- ... are less likely to plan and save for their retirement (Bucher-Koenen and Lusardi 2011).
- ... are less likely to invest in stocks (van Rooij, Lusardi and Alessie 2011).
- ... are more likely to realize paper losses and leave asset markets permanently after the financial crisis (Bucher-Koenen and Ziegelmeyer 2014).

For a review see Lusardi and Mitchell (2014), *Journal of Economic Literature*

# Research Questions and Contribution

- What lies behind the gender gap in financial literacy?
- Why do women answer with “do not know” more frequently?
- Is it due to a lack of knowledge or lack of confidence?



**Does how we measure financial literacy affect our understanding and predictions with regard to financial decisions and economic outcomes?**

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# Evidence from a Survey Experiment

# The Survey Experiment

Sample and structure of the experiment

- DNB Household Panel (DHS)
- Representative online survey of Dutch households
- We include household heads and their partners, age 18+.

## Wave 1: May 2012

Included the “Big 3” Questions:

Interest

Inflation

Risk

One of the answer options was:

*Do not know*

## Wave 2: June/July 2012

Included the “Big 3” Questions:

Interest

Inflation

Risk

But now, we removed the DK-option:

*Do not know*

Instead, after each of the 3 questions we asked for confidence levels:

*On a scale from 1 to 7, How confident are you in this answer?*



# The Survey Experiment

Reminder: The „Big 3“ financial literacy questions

- 1) **Interest:** *Suppose you had 100€ in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? More than 102€ / Exactly 102€ / Less than €102 / Do not know / Refuse to answer*
- 2) **Inflation:** *Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? More than today / Exactly the same / Less than today / Do not know / Refuse to answer*
- 3) **Risk:** *Please tell me whether this statement is true or false. “Buying a single company’s stock usually provides a safer return than a stock mutual fund.” True / False / Do not know / Refuse to answer*

# The Survey Experiment

Additional details on the sample

- **Sample:**

- Completed questionnaire in both waves, N=1532,
- 861 (56.2%) are men and 671 (43.8%) are women.

- **Attrition:** No significant effects of gender or financial literacy on dropping out after wave 1.

- **Learning:** Answers to financial literacy questions in wave 2 for refreshers (N=445) do not differ significantly from participants in both waves.

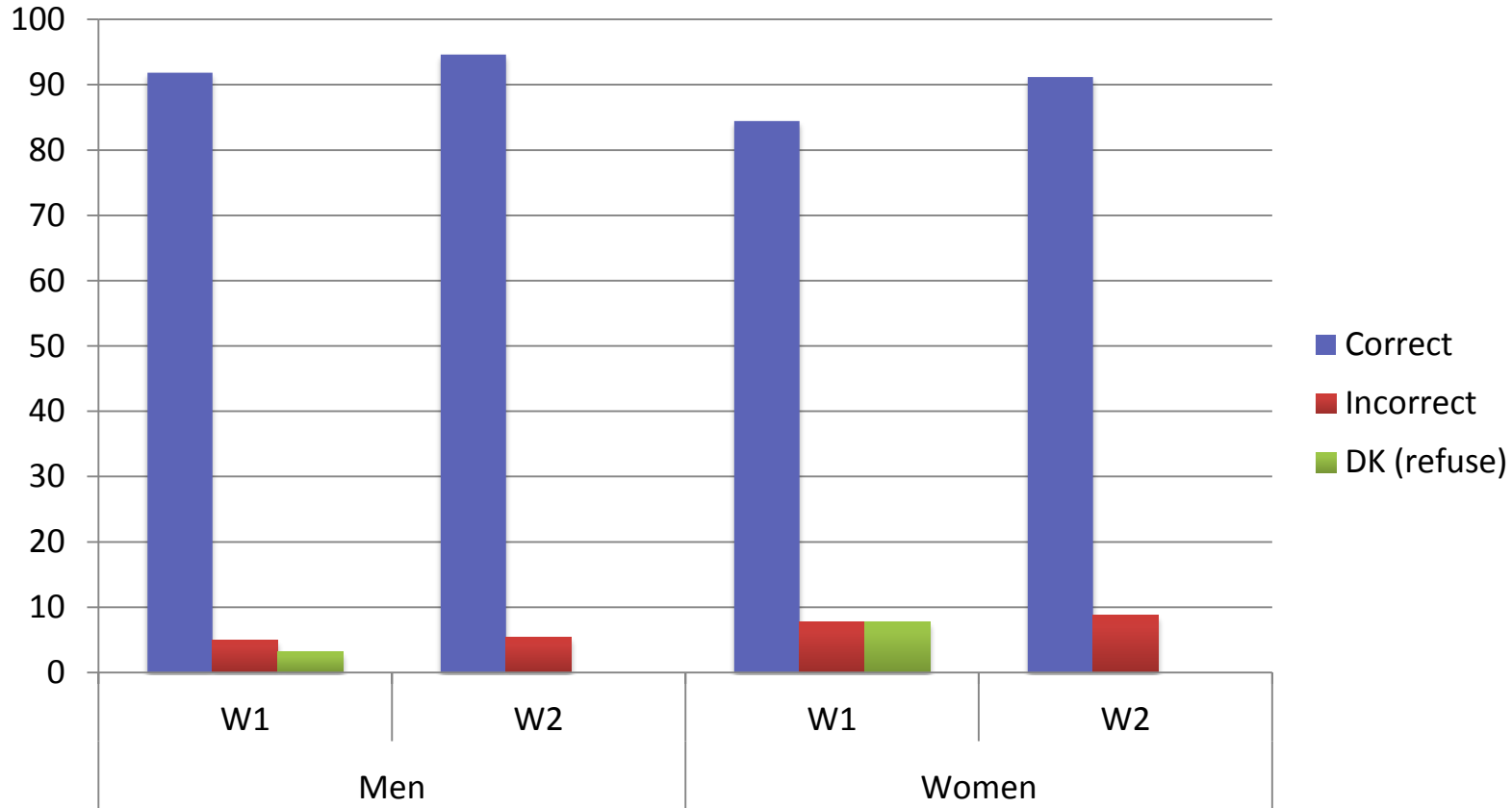
Regression of financial literacy in the wave 2 survey on first or second time of participation

	Interest	Inflation	Risk	Big 3	Big 3 – Men	Big 3 - Women
Participation in July only	0.01 (0.013)	0.01 (0.015)	-0.02 (0.023)	0.00 (0.031)	-0.00 (0.041)	0.04 (0.049)
Observations	1977	1977	1977	1977	1075	902

# Descriptive Statistics

Comparison of answers in first (W1) and second (W2) wave

## Interest

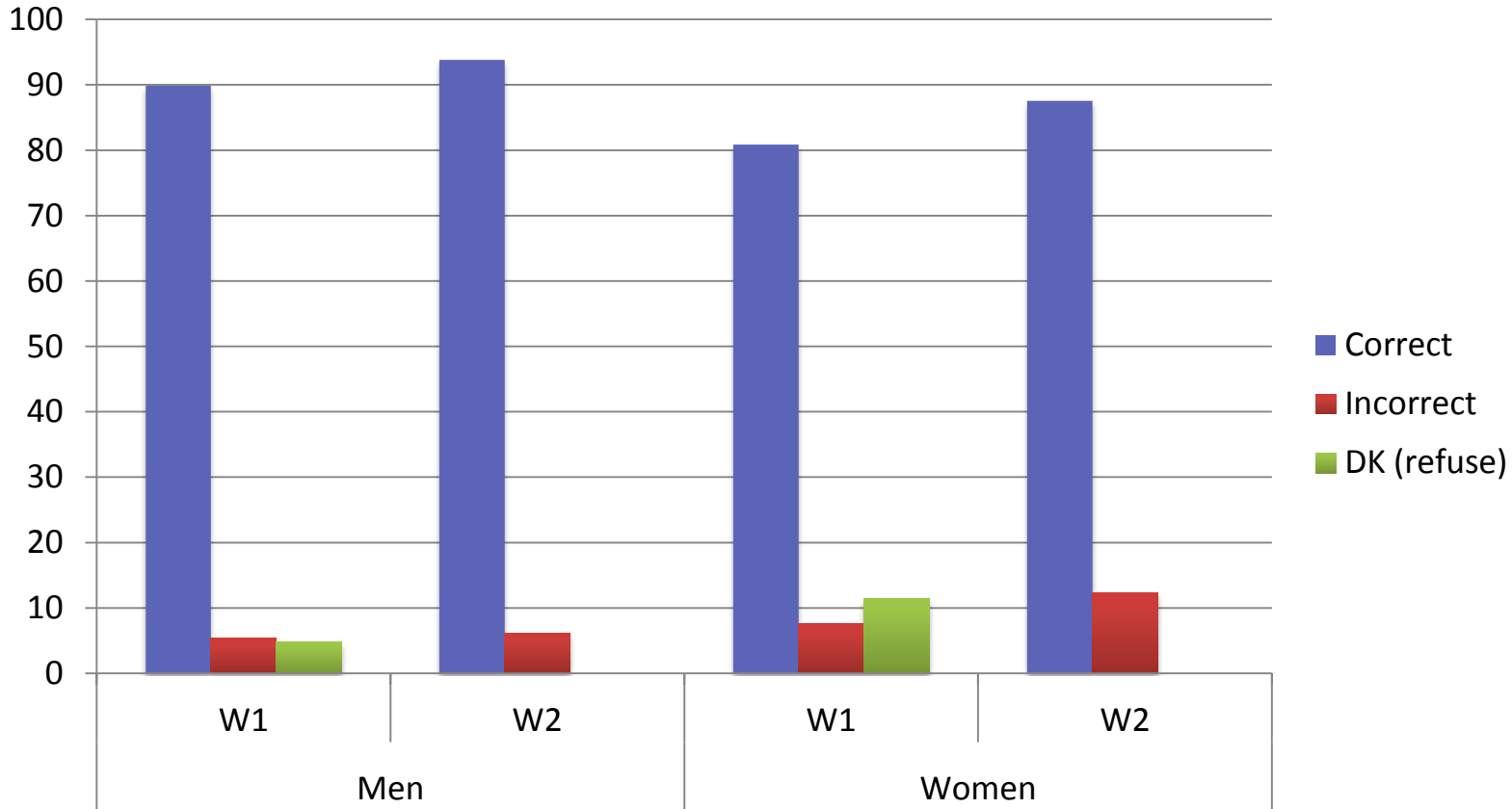


Significant improvement in the probability to give a correct answer for men and women (test against random answering). Gender gap decreases from 7.5 to 3.5 pp.

# Descriptive Statistics

Comparison of answers in first (W1) and second (W2) wave

## Inflation

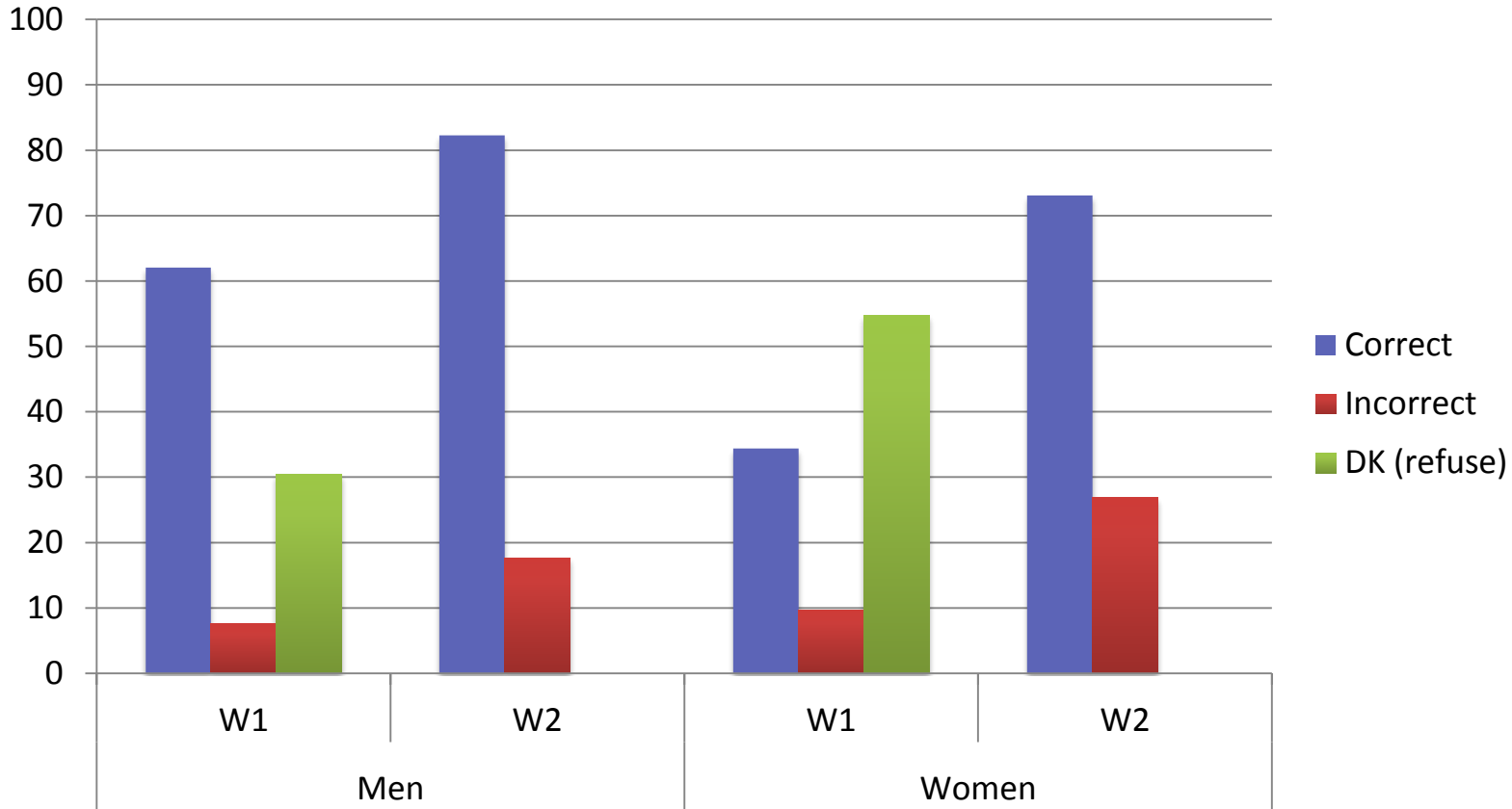


Significant improvement in the probability to give a correct answer for men and women (test against random answering). Gender gap decreases from 9.2 to 6.2 pp.

# Descriptive Statistics

Comparison of answers in first (W1) and second (W2) wave

## Risk



Significant improvement in the probability to give a correct answer for men and women (test against random answering). Gender gap decreases from 27.5 to 9.4 pp.

# Descriptive Statistics

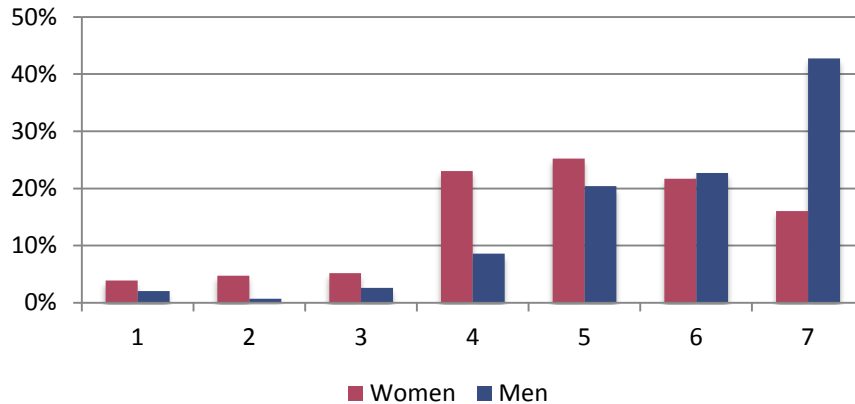
Consistent and inconsistent answering behavior across waves

	Men			Women		
<i>Survey May</i>	incorrect	correct	do not know	incorrect	correct	do not know
<i>Survey July</i>						
<b>A. Interest:</b>						
incorrect	23.26	3.54	29.63	28.3	4.95	30.77
correct	76.74	96.46	70.37	71.7	95.05	69.23
Total	100	100	100	100	100	100
<b>B. Inflation:</b>						
incorrect	41.3	2.72	33.33	30.77	7.02	38.46
correct	58.7	97.28	66.67	69.23	92.98	61.54
Total	100	100	100	100	100	100
<b>C. Risk Diversification:</b>						
incorrect	38.46	10.32	27.38	47.69	12.55	32.27
correct	61.54	89.68	72.62	52.31	87.45	67.73
Total	100	100	100	100	100	100

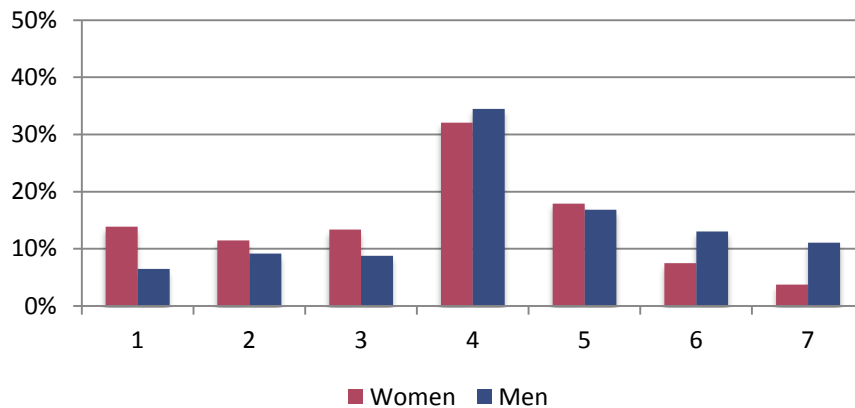
# Descriptive Statistics

Confidence measure conditional on answers in May (W1)

### Confidence cond. Correct



### Confidence cond. Do not know



**Women report substantially lower confidence levels in wave 2 – both when knowing the right answer and when choosing the DK-option in wave 1.**

# Issues with directly observed measures

Rationale for developing an econometric latent class model

1. The **May measure** (W1) corresponds to **classic Big 3 approach**
  - includes “do not know”-option.
  - reflects both knowledge and *confidence*.
2. On the other hand, the **July measure** (W2)
  - forces individuals to answer, and therefore is not confounded by confidence.
  - contains measurement error (due to guessing) and is upward biased as a result.
3. On average, women display lower confidence in their answers compared to men irrespective of their chosen answers.

**Econometric model takes these observations into account, deriving an empirical measure of ‘true financial knowledge’**



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**Measuring and decomposing  
financial literacy:  
A latent class model**

# Econometric Model - Definitions

The central latent variable and observable information

We define the following **latent variable for 'true knowledge'** (not observed) for each financial literacy question:

$\tilde{y}_{ik} = 1$  if respondent  $i$  truly 'knows' the correct answer to literacy question  $k$  ( $k=1,2,3$ ),

$\tilde{y}_{ik} = 0$  otherwise.

**Observed proxies** for this variable:

$y_{ik}^m$  answer to literacy question  $k$  in May; 0 (incorrect), 1 (correct), 2 (do not know);

$y_{ik}^j$  answer to question  $k$  in July; 0 (incorrect) and 1 (correct);

$conf_{ik}^j$  answer to the confidence question on a scale from 1 to 7.

# Econometric Model - Intuition

Predicted probability of '*true financial literacy*'

Our **goal: Predict** the probability that a respondent **truly knows** the answer to literacy question  $k$  based on background characteristics  $x_i$  and on the variables  $y_{ik}^m$ ,  $y_{ik}^j$  and  $conf_{ik}^j$ :

$$P(\tilde{y}_{ik} = 1 | x_i, y_{ik}^m = l_k, y_{ik}^j = m_k, conf_{ik}^j = z_k), k = 1, 2, 3$$

Summary measure of financial literacy:

$$finlit_i = \sum_{k=1}^3 P(\tilde{y}_{ik} = 1 | x_i, y_{ik}^m = l_k, y_{ik}^j = m_k, conf_{ik}^j = z_k)$$

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# Results

# Overview of Results

Financial literacy and gender gap using different measures

	Total	Gender Difference (Men-Women)
<b>Panel A: May measure</b>		
Interest	88.6	7.5
Inflation	85.8	9.2
Risk	49.9	27.5
Financial literacy measure	2.24	0.45
<b>Panel B: July measure</b>		
Interest	93.2	3.5
Inflation	91	6.2
Risk	78.3	9.4
Financial literacy measure	2.62	0.19
<b>Panel C: true financial literacy</b>		
Interest	87.6	5.7
Inflation	86.3	8.8
Risk	64	13.7
Financial literacy measure	2.38	0.28

# Multivariate Regression Results

The gender gap in financial literacy (OLS regression)

	May	July	True literacy
<b>Panel A. Only gender</b>			
Female	-0.442*** (0.0386)	-0.190*** (0.0291)	-0.284*** (0.0352)
Adjusted R <sup>2</sup>	0.067	0.024	0.035
<b>Panel B. With controls for age, income, education, marital status</b>			
Female	-0.361*** (0.0394)	-0.147*** (0.0301)	-0.224*** (0.0361)
Adjusted R <sup>2</sup>	0.156	0.094	0.143

# Economic Consequences (OLS)

Effects of different fl-measures on stock market participation

	No controls	May	July	True literacy
Financial Literacy		0.090*** (0.0105)	0.055*** (0.0097)	0.067*** (0.0101)
Gender	-0.136*** (0.0207)	-0.046*** (0.0212)	-0.072*** (0.0213)	-0.065*** (0.0213)
Controls+	no	yes	yes	yes
N	1532	1532	1532	1532
Adjusted R <sup>2</sup>	0.022	0.137	0.117	0.122

Controls+: Age, income, education, marital status

# Economic Consequences (IV)

Taking potential reverse causality/omitted variables into account

- **Instrument:** Economics in high school
- **3 groups:** None, some, DK

	May	July	True literacy
Financial Literacy	0.192*** (0.0671)	0.222*** (0.0842)	0.204*** (0.0751)
Gender	-0.003 (0.0369)	-0.031 (0.0308)	-0.024 (0.0325)
First stage F-stats	14.19	9.19	11.26

Further controls: Age, income, education, marital status



# The Issue of Underconfidence

Quantifying underconfidence and its economic effects

- **Underconfidence** can be defined directly from our model
- Specifically, we calculate the **prob of true knowledge conditional on a DK-answer** in the first wave

$$\text{und\_conf} = \sum_{k=1}^3 P(\tilde{y}_{ik} = 1 | y_{ik}^m = 2, \text{conf}_{ik} = z, x_i) \cdot I(y_{ik}^m = 2)$$

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	OLS I	OLS II	GMM I	GMM II
Financial Literacy	0.067***	0.070***	0.185**	0.181**
,true literacy'	(0.0101)	(0.0100)	(0.0810)	(0.0706)
Underconfidence		-0.062***	-0.054	-0.066***
		(0.0094)	(0.112)	(0.0099)
Gender	-0.065***	-0.047**	-0.015	-0.013
	(0.0213)	(0.0211)	(0.0368)	(0.0318)
R <sup>2</sup>	0.132	0.150	0.094	0.098

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# Conclusion

## Main insights

### ***How financial literacy is measured matters!***

- We differentiate two channels for the observed gender gap in financial literacy: a gap in *knowledge* and a gap in *confidence*
- Classic measure exacerbates apparent gender gap in knowledge in descriptive statistics and leads to a bias in OLS regressions.
- Gender gap in financial literacy decreases but does not disappear when deleting the “Do not know option”.

### ***We develop a new strategy to measure actual knowledge***

- We are able to consistently estimate whether a respondent *truly knows* the correct answer and therefore improve the measurement of financial literacy.
- 36-38% of the gender gap in financial literacy is due to different response behavior, which is driven by differences in confidence.

# Conclusion

Central policy implications

## ***Matters crucially for financial education programs***

- Policies focus on increasing financial literacy, i.e., knowledge of financial matters
- Our results show that for a highly relevant group of the population, *this is not enough!* Financial decisions and economic outcomes also depend on confidence.
- To be fully effective, programs therefore have to instill confidence in financial decision making.

*Financially, women on average know less than men –  
but they know more than they think they know.*

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**Thank you!**