

# Investment Skills & Wealth Inequality

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[OXFAM Report 2022]

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- **Limited stock market participation**

"...all investors should participate in the stock market. [...] the lack of participation is a robust feature of the data."  
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⇒ Both (highly) **matter** for growth, development, efficiency

## (Heterogeneous) Returns

From heterogeneous returns to labor to...  
heterogeneous **returns to capital**

→ Heterogeneity in individual skills  
(Talent, genetic endowment, cognitive abilities, human capital)

⇒ Skilled individuals make better investment decisions

- Proficient portfolio diversification (Calvet et al., 2007 & 2009)
- Anxiety control in risky investments (Gennaioli et al., 2015)
- Superior information management (Kacperczyk, 2019)
- Higher propensity for risk-taking (Barth et al., 2020)

## (Heterogeneous) Returns

⇒ Heterogeneity in financial portfolio

- Stock market participation & asset allocation
- Alternative rationale for limited participation (Participation costs (Fagereng et al., 2017); Income risk (Bonaparte et al. 2014, Bagliano et al. 2022); Financial literacy (van Rooij et al., 2011))

⇒ Heterogeneity in returns to wealth

- Patterns of wealth accumulation across individuals
- Correlation between levels and returns to wealth (Benhabib et al., 2011; Gabaix et al. 2016)
- No effect of education on  $K$ -returns conditional on skills (Fagereng et al. 2020)

# This Project

We study the link between

Individual Skills – *Education* – Wealth Inequality

→ Through the channel of **Financial Investment** decisions



# Skills, Education, and Wealth Inequality

- Simple (stylized) model
- Empirical evidence (Individual survey data)

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⇒ Education improves individuals' investment skills

- Preventing unskilled investors from bad investments
- Then closing the top-bottom gap in wealth distribution

⇒ Beneficial effect of education on returns to wealth

- Due to beneficial effect on stock market participation
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**Main Takeaway:** Role of education to alleviate wealth inequality

→ By promoting market participation of unskilled individuals

# Dutch Data

## Dutch Household Survey (DHS) 1993-2022

- Individual/Household Level
- **Annual** surveys
- Personal Characteristics (**Education**, Demographic)
- Labor Income and Wealth (Financial, Real)
- Financial Investments (**Financial Assets**)
  - Stock Market Participation
  - Direct Stock AND/OR Mutual Funds

⇒ **11,098** unique individuals

# Education Premium in Returns to Wealth

Extra-returns earned by highly-educated individuals

→ Fraction due to financial investments

- Stock market participation
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⇒ **Positive, significant, and sizeable premium**

- Graduated earn 3.70% extra-returns to wealth
- $\approx 19\%$  due higher propensity for stock market
- Remarkable effect for Economics

→ **Two effective mechanisms**

- Portfolio Diversification
- Participation Persistence

## Italian Data (SHIW)

Long time-series (from '80) & Panel dimension (8,113 individuals)

- Individual/Household Level (Biannual surveys)
- Detailed Information (**Education**, Income, Wealth...)  
⇒ University major (Economics, STEM, Law,...)
- **Savings/Consumption**  
⇒ *Returns to Wealth* (Lusardi et al. 2017)
- Financial Investments (**Financial Assets**)
  - Stock Market Participation
  - Asset Allocation
  - Stock AND/OR Mutual Funds

⇒ Widely used in Household Finance

[Paiella & Pistaferri (2017), Jappelli & Pistaferri (2020)]

## Return to Wealth: Lusardi et al.(2017)

$$W_{i,t} = (W_{i,t-1} + X_{i,t-1} - C_{i,t-1}) \cdot (1 + WR_{i,t}), \quad (1)$$

$W_{i,t}$ : total wealth of  $i$  at  $t$ ,

$X_{i,t}$ : net labor income,

$C_{i,t}$ : consumption expenditure,

$WR_{i,t}$ : *wealth returns*

$$WR_{i,t} = \frac{W_{i,t}}{W_{i,t-1} + S_{i,t-1}} - 1, \quad (2)$$

$S_{i,t-1}$ : savings of  $i$  at  $t - 1$ .



## Individual Skills

We proxy individual **skills** by estimating:

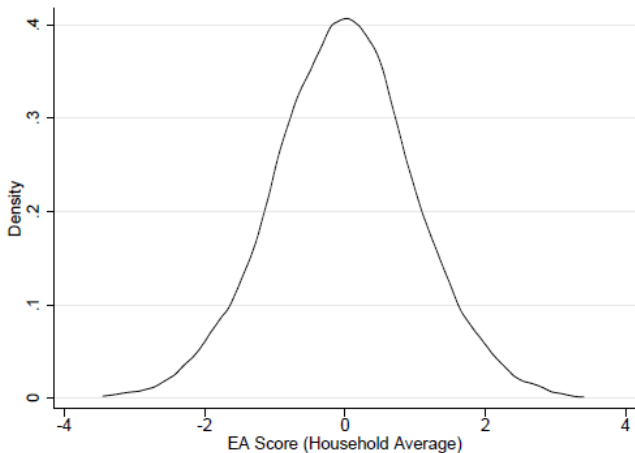
$$\ln(z_{i,t}) = \gamma_1 e_{i,t} + \gamma_2 a_{i,t} + \gamma_3 a_{i,t}^2 + h(e_{i,t}, a_{i,t}, g_i) + f_i + \epsilon_{i,t} \quad (3)$$

- $\ln(z_{i,t})$ : log-earnings of individual  $i$  at year  $t$ ,
- $e_{i,t}, a_{i,t}, g_i$ : education rank, age, gender of  $i$  at year  $t$ ,
- $h(e_{i,t}, a_{i,t}, g_i)$ : polynomial up to fourth order,
- $\epsilon_{i,t}$ : error term,

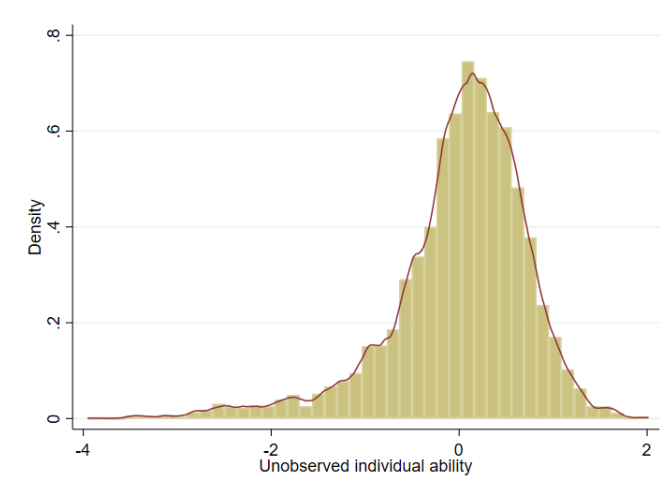
and extracting individual fixed effects.

$\Rightarrow \hat{f}_i$ : **unobserved individual ability**

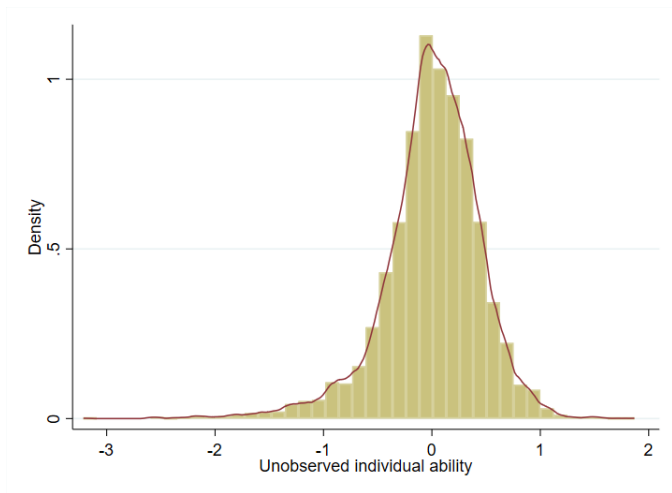
## Skills Distribution: Barth et al., (JPE 2020)



## Skills Distribution. DHS



## Skills Distribution. SHIW



## Preliminary Evidence

We replicate the regression analysis of Barth et al. (JPE 2020).

→ Our estimate of individual skill is

- Highly heterogeneous across individuals
- **Positively** associated to **Wealth** (total, financial, real)  
Wealth regression
- **Negatively** associated to **Risk Aversion**  
Risk regression
- **Positively** associated to **Participation & Equity Share**  
Asset allocation

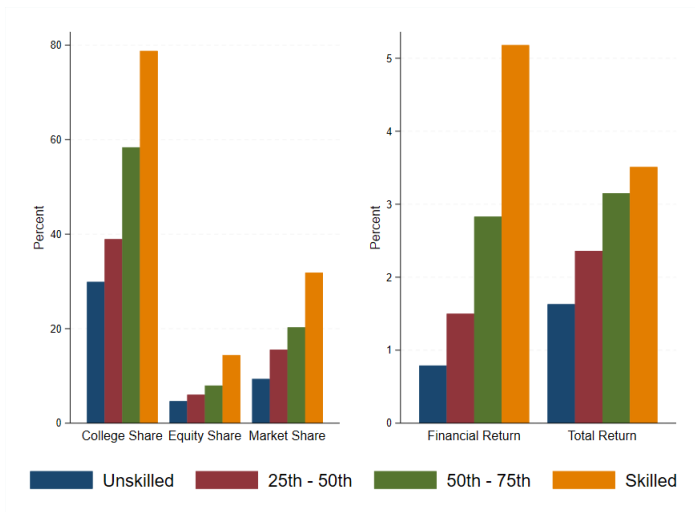
## DHS: Descriptive evidence

Quartile	College Share	Market Share	Equity Share	Fin. Return	Tot. Return
Unskilled	29.90%	9.36%	4.65%	0.79%	1.63%
25-50th	38.94%	15.55%	6.03%	1.50%	2.36%
50-75th	58.37%	20.27%	7.96%	2.83%	3.15%
Skilled	78.77%	31.85%	14.41%	5.18%	3.51%

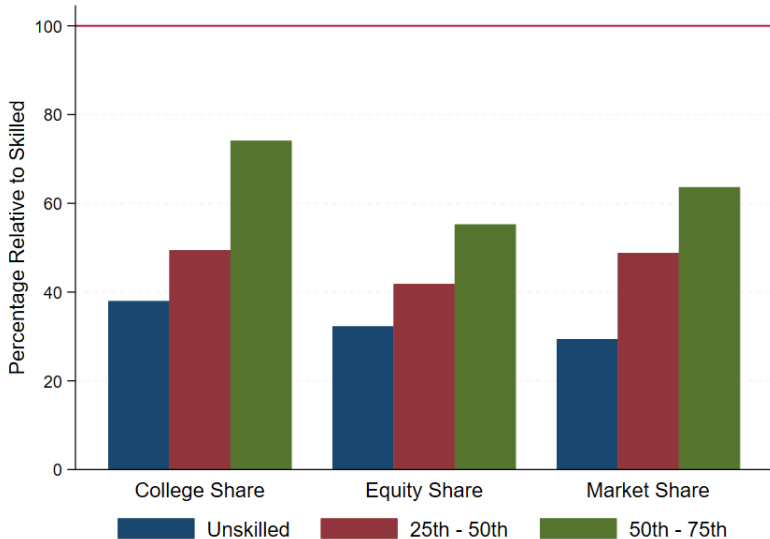
$$TR_{i,t} = \ln \left( \frac{W_{i,t}}{W_{i,t-1}} \right)$$

$$FR_{i,t} = \ln \left( \frac{FW_{i,t}}{FW_{i,t-1}} \right)$$

# DHS: Graphical Evidence



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## Structural Equation Model

$$Y_{i,t} = \beta_0 + \beta_1 \mathcal{I}_{i,t}^P + \beta_2 \text{Edu}_{i,t} + \beta_3 \text{Skills}_i + \beta_4 (F) W_{i,t-1} + X'_{i,t} \gamma + \epsilon_{i,t} \quad (4)$$

$$\mathcal{I}_{i,t}^P = \delta_0 + \delta_1 \text{Edu}_{i,t} + \delta_2 \text{Skills}_i + \delta_3 (F) W_{i,t-1} + X'_{i,t} \gamma + \nu_{i,t} \quad (5)$$

- $\beta_2$ : **Direct** Effect (of **Education** on  $Y$ )
- $\beta_1 \delta_1$ : **Indirect** Effect (of **Education** on  $Y$  through  $\mathcal{I}_{i,t}^P$ )
- $\beta_2 + \beta_1 \delta_1$ : **Total** Effect (of **Education** on  $Y$ : **Direct** + **Indirect**)

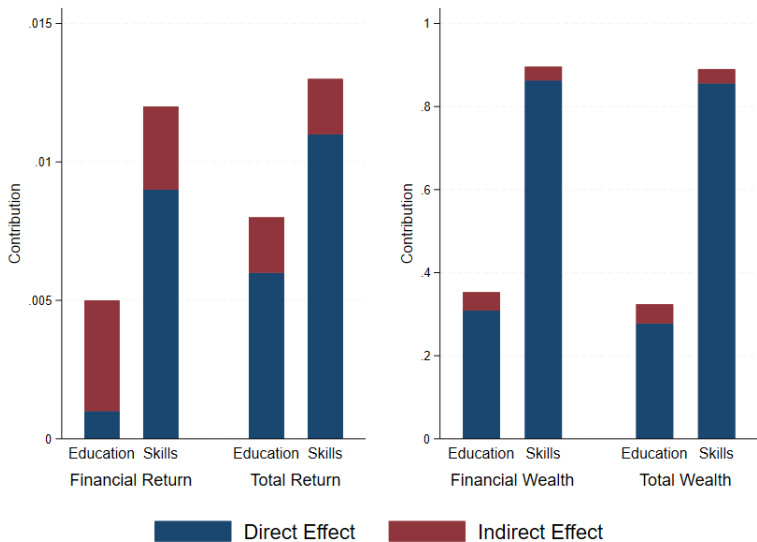
# DHS: Education Effect

	Total Wealth (1)	Financial Wealth (2)	Total Returns (3)	Financial Returns (4)
<b>Direct Effect:</b>				
Education	0.278*** (0.053)	0.309*** (0.071)	0.006 (0.010)	0.001 (0.011)
Skills	0.856*** (0.043)	0.863*** (0.059)	0.011 (0.008)	0.009 (0.008)
<b>Indirect Effect:</b>				
Education	0.046*** (0.009)	0.044*** (0.009)	0.002** (0.001)	0.004*** (0.001)
Skills	0.034*** (0.006)	0.033*** (0.006)	0.002*** (0.001)	0.003*** (0.001)
<b>Total Effect:</b>				
Education	0.324*** (0.054)	0.353*** (0.072)	0.008 (0.010)	0.005 (0.011)
Skills	0.889*** (0.043)	0.896*** (0.060)	0.012 (0.008)	0.012 (0.008)

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

# DHS: Graphical Evidence



## DHS: Additional Results & Robustness

- Excluding Covid-19 (Data up to 2019)  
→ **Unaltered results**
- Omitting individual skills  
→ **Larger education effect**
- Stricter definition of higher education  
→ **University degree drives results**
- Stock vs Mutual Funds (MFs)  
→ **Larger effect with MFs** (Diversification effect)

# SHIW: Preliminary Evidence

PANEL A: Initial Wealth

Quartile	Uni Degree	Participation	Only Stock	Only MF	Risky Share	Stock Share	MF Share	Wealth Return
Poor	5.26%	3.76%	1.20%	2.29%	2.90%	0.92%	1.93%	-15.70%
25-50th	6.30%	7.63%	2.44%	4.20%	4.40%	1.44%	2.95%	4.21%
50-75th	10.42%	15.33%	4.73%	8.49%	7.90%	2.55%	5.37%	7.59%
Rich	21.67%	31.39%	10.14%	13.06%	14.04%	5.27%	8.79%	18.56%

# SHIW: Preliminary Evidence

PANEL C: University Fields

Quartile	Participation	Only Stock	Only MF	Risky Share	Stock Share	MF Share	Wealth Return
Economics	42.43%	16.14%	14.14%	19.09%	9.54%	9.64%	10.33%
Law/Politics	29.95%	9.07%	13.60%	14.41%	5.22%	9.15%	6.74%
Medicine	27.88%	9.55%	11.50%	12.14%	4.47%	7.64%	6.80%
STEM	31.93%	8.52%	14.44%	15.16%	5.07%	9.94%	6.08%
Humanistic	22.17%	7.17%	10.29%	11.46%	3.91%	7.58%	5.65%

# SHIW: Education Effect

Wealth Returns	OwnSTKMF	OwnSTKMF	PropSTKMF	PropSTKMF
<b>Direct Effect:</b>				
Education	0.030*** (0.009)	0.011 (0.009)	0.042*** (0.009)	0.027*** (0.010)
Skills		0.086*** (0.009)		0.077*** (0.011)
<b>Indirect Effect:</b>				
Education	0.007*** (0.000)	0.003*** (0.001)	0.004*** (0.001)	0.002** (0.001)
Skills		0.010*** (0.001)		0.007*** (0.001)
<b>Total Effect:</b>				
Education	0.037*** (0.009)	0.014 (0.009)	0.046*** (0.009)	0.029*** (0.010)
Skills		0.096*** (0.009)		0.084*** (0.011)

# SHIW: University Fields

Panel A: Participation					
Wealth Returns	Economics	Politics	Medicine	STEM	Humanistic
<b>Direct Effect:</b>					
	0.016 (0.027)	-0.032 (0.022)	0.015 (0.026)	0.005 (0.019)	0.003 (0.019)
<b>Indirect Effect:</b>					
OwnSTKMF	0.007** (0.004)	0.002 (0.003)	-0.006 (0.004)	0.002 (0.002)	-0.004* (0.002)
<b>Total Effect:</b>					
	0.023 (0.027)	-0.030 (0.022)	0.009 (0.026)	0.007 (0.019)	-0.001 (0.019)

Panel B: Asset Allocation					
Wealth Returns	Economics	Law/Politics	Medicine	STEM	Humanistic
<b>Direct Effect:</b>					
	0.013 (0.030)	-0.023 (0.023)	0.017 (0.029)	0.006 (0.021)	-0.006 (0.020)
<b>Indirect Effect:</b>					
PropSTKMF	0.002 (0.002)	0.002 (0.003)	-0.005* (0.003)	0.002 (0.002)	-0.002 (0.002)
<b>Total Effect:</b>					
	0.014 (0.030)	-0.021 (0.024)	0.012 (0.028)	0.008 (0.021)	-0.008 (0.020)



# SHIW: Economic Mechanisms

- **Portfolio Diversification**

- Direct Stockholding vs Mutual Funds shares

- Indirect effect of Education

- **Ownership Persistence**

- Participation Frequency & Turnover

- Indirect effect of Education

# SHIW: Direct Stockholding

Wealth Returns	OwnSTK	OwnSTK	PropSTK	PropSTK
<b>Direct Effect:</b>				
Education	0.035*** (0.009)	0.013 (0.009)	0.045*** (0.010)	0.028*** (0.010)
Skills		0.093*** (0.009)		0.081** (0.011)
<b>Indirect Effect:</b>				
Education	0.002** (0.001)	0.001 (0.001)	0.001** (0.001)	0.001 (0.000)
Skills		0.003*** (0.001)		0.002*** (0.001)
<b>Total Effect:</b>				
Education	0.037*** (0.009)	0.014 (0.009)	0.046*** (0.009)	0.029*** (0.010)
Skills		0.096*** (0.009)		0.084** (0.011)

# SHIW: Mutual Funds

Wealth Returns	OwnMF	OwnMF	PropMF	PropMF
<b>Direct Effect:</b>				
Education	0.032*** (0.009)	0.012 (0.011)	0.043*** (0.009)	0.026*** (0.009)
Skills		0.089*** (0.009)		0.080*** (0.010)
<b>Indirect Effect:</b>				
Education	0.005*** (0.001)	0.002*** (0.001)	0.002*** (0.001)	0.002** (0.001)
Skills		0.006*** (0.001)		0.004*** (0.001)
<b>Total Effect:</b>				
Education	0.037*** (0.008)	0.014 (0.009)	0.046*** (0.009)	0.028*** (0.009)
Skills		0.096*** (0.009)		0.084*** (0.010)

# SHIW: Ownership Dynamics

	(1) Frequency	(2) Frequency	(3) Rebalancing	(4) Rebalancing
Education	0.063*** (0.006)		0.028 (0.045)	
Politics		-0.115*** (0.021)		0.087 (0.109)
Medicine		-0.176*** (0.138)		0.066 (0.162)
STEM		-0.101*** (0.019)		0.169 (0.112)
Humanistic		-0.139*** (0.019)		0.183 (0.121)
Skills	0.137*** (0.004)	0.216*** (0.021)	0.232** (0.096)	0.436** (0.203)
Labour Income	0.016*** (0.004)	0.030 (0.019)	-0.180** (0.087)	-0.287 (0.215)
Wealth Class	0.037*** (0.001)	0.039*** (0.006)	0.045** (0.023)	0.043 (0.051)
Observations	40,531	4,233	2,671	616
R2	0.194	0.200	0.018	0.033
Controls	YES	YES	YES	YES

# SHIW: Frequency & Rebalancing

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Wealth Returns	Frequency	Frequency	Rebalancing	Rebalancing
<b>Direct Effect:</b>				
Education	0.029*** (0.009)	0.011 (0.009)	0.067*** (0.023)	0.045* (0.023)
Skills		0.087*** (0.009)		0.172*** (0.036)
<b>Indirect Effect:</b>				
Education	0.009*** (0.002)	0.002*** (0.001)	0.001 (0.001)	0.001 (0.001)
Skills		0.009*** (0.002)		0.001 (0.001)
<b>Total Effect:</b>				
Education	0.038*** (0.009)	0.013 (0.009)	0.068*** (0.023)	0.046** (0.023)
Skills		0.096*** (0.009)		0.173*** (0.036)

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# SHIW: Frequency & Rebalancing

Panel A: Participation Frequency					
Wealth Returns	Economics	Politics	Medicine	STEM	Humanistic
<b>Direct Effect:</b>					
	0.014 (0.027)	-0.031 (0.022)	0.014 (0.027)	0.006 (0.019)	0.002 (0.019)
<b>Indirect Effect:</b>					
Frequency	0.009** (0.004)	0.001 (0.003)	-0.005 (0.004)	0.001 (0.002)	-0.004 (0.002)
<b>Total Effect:</b>					
	0.023 (0.027)	-0.030 (0.022)	0.009 (0.026)	0.007 (0.019)	-0.002 (0.019)

Panel B: Portfolio Turnover					
Wealth Returns	Economics	Politics	Medicine	STEM	Humanistic
<b>Direct Effect:</b>					
	0.064 (0.068)	-0.039 (0.053)	-0.014 (0.069)	-0.010 (0.040)	0.003 (0.042)
<b>Indirect Effect:</b>					
Rebalancing	-0.003 (0.003)	-0.000 (0.003)	0.002 (0.004)	0.003 (0.003)	-0.003 (0.003)
<b>Total Effect:</b>					
	0.061 (0.068)	-0.039 (0.053)	-0.012 (0.069)	-0.007 (0.040)	0.000 (0.041)

# Summary & Conclusions

Overall, our results support that

- Well-diversified portfolios
- Long-term investments

deliver better (risk-adjusted) returns compared to

- Direct stock-holding
- Short-term strategies

# Summary & Conclusions

More specifically, we highlight the **indirect** effect of

- **General** high education (University degree)
  - Preference for well-diversified portfolios (MFs shares)
- **Specific type** of high education (Economics degree)
  - Persistence in stock market participation