

# Digital Transmission of Financial Knowledge: Evidence from Stock Market Investment

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**Can digital nudging overcome inertia, transmit information and knowledge, and entice people to invest in capital markets sensibly?**

The views expressed in this research and related publications are those of the authors and do not necessarily reflect the views of their affiliations

# The Rise of Digital Finance and the Stock Market Puzzle

## Digitalization reshapes

- Investment: (D'Acunto, Prabhala, and Rossi 2019; Reher and Sokolinski 2024; Rossi and Utkus 2024)
- Saving: (Gargano and Rossi 2024)
- Lending (Buchak et al. 2018; D'Acunto, Ghosh, and Rossi 2022)
- Payments (Dubey and Purnanandam 2023; Higgins 2020)

## Provide low-transaction-cost solutions

- access a diverse range of products – from equities and bonds to ETFs, mutual funds...
- Very low entry barriers (low investment thresholds)

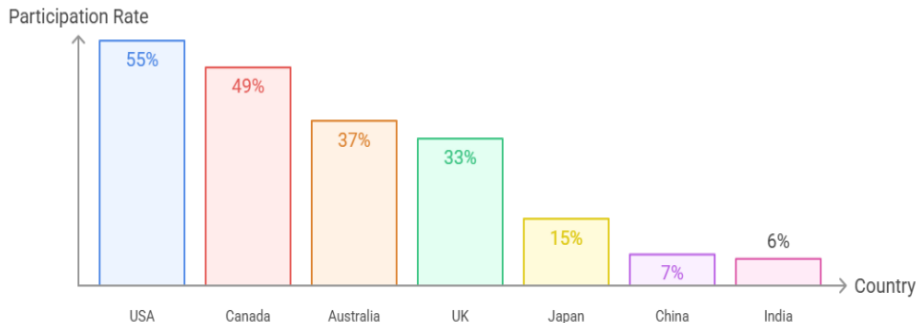
## Revolutionize the dissemination of financial knowledge

- Social media (Chen et al., 2025; Cookson et al., 2024; Farrell et al., 2022)
- Robo-advisor (Reher and Sokolinski, 2024; Rossi and Utkus, 2024)

# Still a puzzle: Limited participation in capital markets

Stock market participation by country: very low in Japan, China & India

The majority have mobile phones



Stock Market Participation by Country

# Apply to China: Low Stock Market Participation & Disparity

## China:

- About 86% do not participate, and many of the **14% who participate exhibit speculative trading behaviors** (Jones et al. 2023)
  - Chinese household assets: real estate (59.1%), financial assets (20.4%), equity (less than 2%), and consumer durables and operating assets (12.9%)<sup>1</sup>
- **Lack of SMP is particularly prevalent among older, less educated, and less wealthy individuals**
  - high entry barriers, lack of information, and knowledge
- **Can digital means reduce entry barriers, overcome behavior inertia, transmit knowledge/information so that people invest in the capital markets efficiently and effectively?**

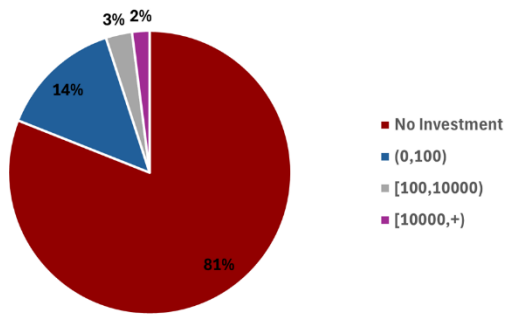
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<sup>1</sup>Survey on the Assets and Liabilities of Urban Households in China in 2019

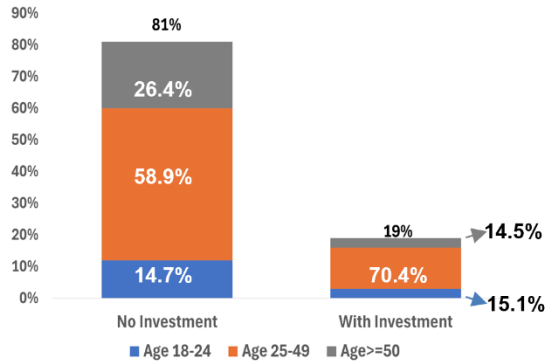
# One Platform Users: 81 % do not invest, esp. the older, less educated, and less wealthy

## The digital platform studied (end of December 2022)

- More than 1 billion customers  $\approx 72\%$  population
- Covers a vast geographic scope and financial status
- provides 6 types of mutual funds (equity, bond, hybrid, index, QDII, and gold)



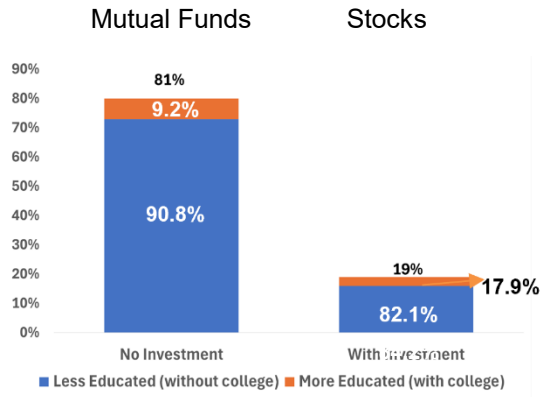
Panel A. The Overall Distribution



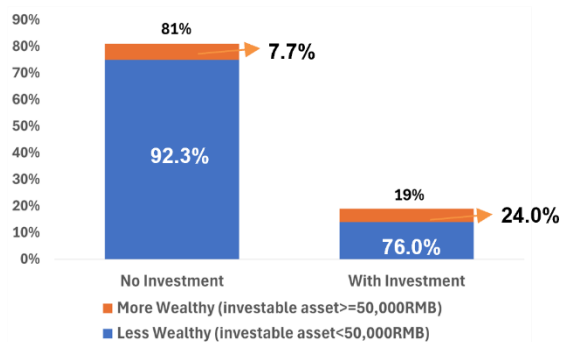
Panel B. By Age

Source: Calculations are based on platform data (1 RMB = 0.14 USD)

# Platform Users: 81 % do not invest, esp. the older, less educated, and less wealthy



Panel C. By Education Level



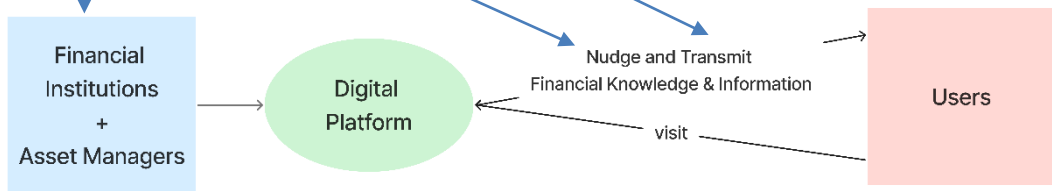
Panel D. By Investable Asset

Source: Calculations are based on platform data (1 RMB = 0.14 USD)

## Can digital means reduce entry barriers, overcome behavior inertia, transmit knowledge / information so that people invest in the capital markets efficiently and effectively?

Compared to the traditional approach (Kaiser et al. 2022), platforms offer:

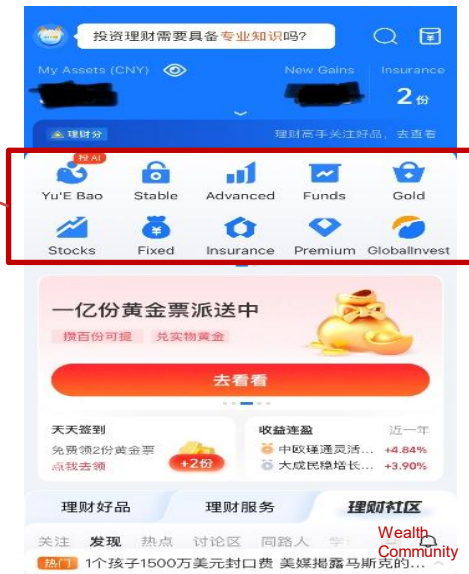
- **Inexpensive access** to instruments (low transaction cost, liquidity), and
  - Scalable, cost-effective, convenient **access to financial knowledge and information**
- **Nudge users** toward accessible, diversified investments



# Digital platform's offers:

Digital platforms offer:

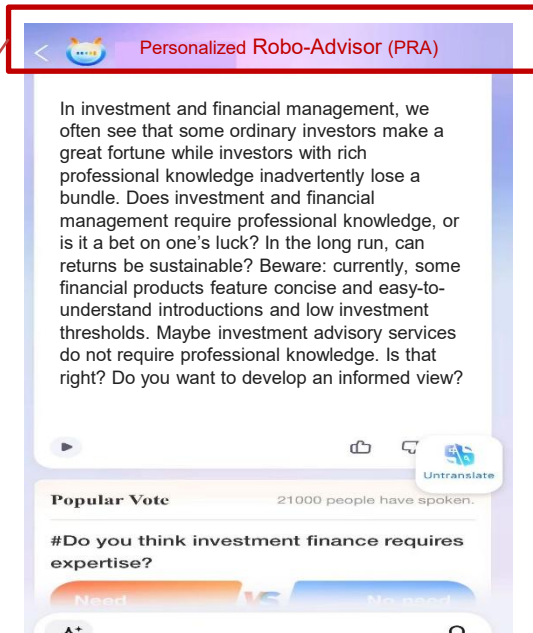
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### Visual Content: Short-video+ Graphic & text

#### Short-video



#### Graphic & text

大消费主线近期持续走强, 今日白酒板块大反弹, 原因是什么? 还有机会吗?

从原因上看, 在关税背景下, 内需消费就更受重视了, 各种刺激消费的政策出台, 以及各大平台也出台了支持外贸企业内销的措施, 提振了市场消费的信心。

此外, 大消费主线, 最近4年持续调整, 白酒板块更是如此, 中证白酒指数目前市盈率19.75, 市盈率百分位11.22%, 处在历史低位, 后市潜力大。



# The platform offers a **natural experimental setting**

The platform runs a marketing campaign on every 18<sup>th</sup> of a month – **nudging**

- **Randomly** distributes campaign messages to platform residents to draw their attention to its digital information services (**overcome endogeneity**)
- Our treatment period is from *January 18<sup>th</sup>* to *February 17<sup>th</sup>* 2023



# Research Question and Test

**Can digital nudging overcome inertia, transmit information and knowledge, and entice people to invest in capital markets sensibly?**

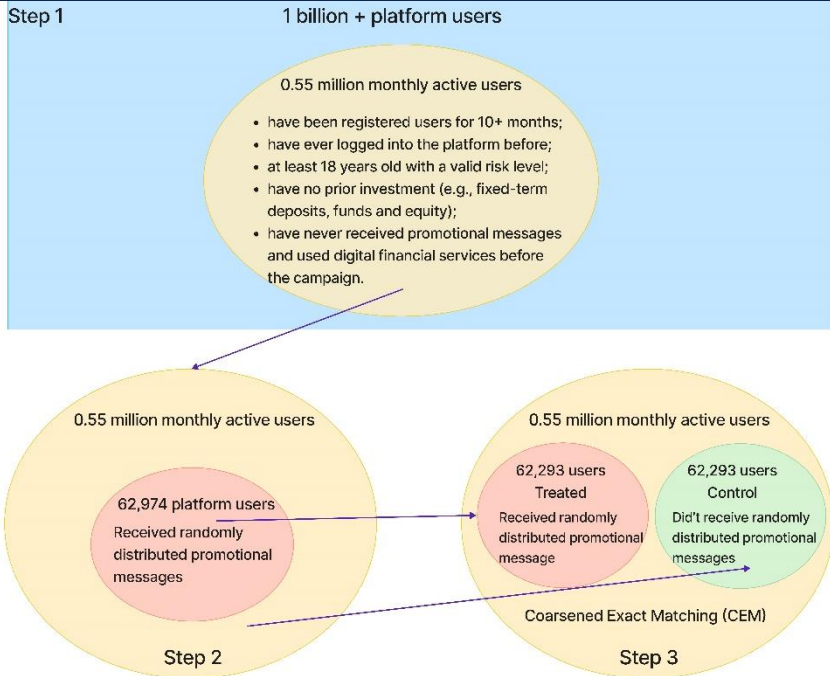
**Check whether:**

- **Digital nudging** entices uninitiated households to **acquire financial knowledge and information** and subsequently
  - **increase** their investment in capital market products,
  - build a **diversified** portfolio, and,
  - attain a **good risk-adjusted performance**

**The **randomly distributed nudging** messages allow us to overcome that the acquisition of information, knowledge, and investing are endogenous**

**(A quasi-experiment)**

# Quasi-Experimental Setting: nudged, responded, and changed



# Response to Nudge: Platform Exposure

The platform integrates multiple financial information channels:

- a) Personalized robo-advisor (PRA)
- b) Wealth community:
  - 1) wealth forum; 2) visual contents (the financial information posted as short videos or image-texts); 3) other (including the super-topic section, columns, and blogs written by financial advisors or influencers)

**"Time"** = total interactive time (seconds) with "a" and "b".

$$Platform \text{ Exposure}_i = \frac{Total \ Time_i - \min(Total \ Time_i)}{\max(Total \ Time_i) - \min(Total \ Time_i)} * 100$$

- It is assessed by both intensive and extensive margins

# Identification Strategy (overcome that exposure is endogenous)

## Treatment vs control groups

## Responses

The dummy "Nudge" indicates whether a platform resident has received the marketing message

Treated group:  
received nudging

————→ exposed

————→ non-exposed

Control group:  
didn't received nudging

————→ exposed

————→ non-exposed

### ➤ *First Stage*

$$PlatformExposure_i = \alpha + \theta 1\{Nudge\}_i + \varepsilon_i$$

→ mitigate endogeneity

### ➤ *Second Stage*

$$Y_i = \alpha + \beta \widehat{PlatformExposure}_i + \varepsilon_i$$

$Y_i$ =stock market participation, diversification, portfolio performance

# Summary of Main Findings

- **2.1% responded to the first round of nudging, i.e., acquired financial info/knowledge via the platform**
- **29%: Rate of ever responded, with repeated nudging (6 times) :**
- **24% of 1<sup>st</sup> time respondents invest with sustained results**
  - **investment engagement ↑:**
    - stock market participation
    - mutual Fund Balance
    - equity holding ratio
  - **portfolio diversification ↑:**
    - portfolio allocation
    - fund number & fund type
  - **other investment behaviors ↑:**
    - automatic investment adoption
  - **portfolio performance ↑: Abnormal Sharpe Ratio**
- The impact is notable across nearly all demographic groups except for wealthier individuals.
- Digitally transmitted financial knowledge **benefits the older, less educated, and less wealthy.**

All variables are measured at the individual level with a monthly frequency.

## 1. Investors' characteristics

- age, gender, education, risk level (0-5), investable asset level

## 2. Platform exposure

- IV: Nudge (PRA + wealth community)
- the length of interactive times with PRA and wealth community (its three subcomponents: forum, visual content, and other)

## 3. Investment outcome

- investment engagement: stock market participation (dummy), mutual fund balance, equity ratio
- investment behavior: allocation score, automatic investment score, fund number, fund type, fund holding duration
- performance: portfolio returns / volatilities (annualized)

# Data

|                            | $\overline{Diff}$ | t-stat | N       | Mean  | SD    | P1 | P25 | P50 | P75 | P99 |
|----------------------------|-------------------|--------|---------|-------|-------|----|-----|-----|-----|-----|
| Age                        | -0.04             | -0.52  | 124,586 | 36.17 | 12.26 | 18 | 26  | 35  | 45  | 68  |
| Gender                     | 0.00              | 0.00   | 124,586 | 0.56  | 0.50  | 0  | 0   | 1   | 1   | 1   |
| High Education             | 0.00              | 0.00   | 124,586 | 0.13  | 0.34  | 0  | 0   | 0   | 0   | 1   |
| Investable Asset >= CNY 5W | 0.00              | 0.00   | 108,902 | 0.05  | 0.22  | 0  | 0   | 0   | 0   | 1   |
| Risk Level                 | 0.00              | 0.00   | 124,586 | 0.91  | 1.15  | 0  | 0   | 0   | 2   | 4   |

# Baseline Results

## First Stage: Acquisition of Platform Exposure (strong IV)

$$\text{Intensive : PlatformExposure}_i = a + \theta \mathbb{1}\{Nudge\}_i + \varepsilon_i$$

$$\text{Extensive : } \mathbb{1}\{\text{PlatformExposure}\}_i = a + \theta \mathbb{1}\{Nudge\}_i + \varepsilon_i$$

|                         | $\text{PlatformExposure}_i$ | $\mathbb{1}\{\text{PlatformExposure}\}_i$ |
|-------------------------|-----------------------------|-------------------------------------------|
|                         | Intensive                   | Extensive                                 |
| $\mathbb{1}\{Nudge\}_i$ | 0.053***<br>(12.28)         | 0.020***<br>(35.01)                       |
| Adj R <sup>2</sup>      | 0.001                       | 0.010                                     |
| Obs                     | 124,586                     | 124,586                                   |
| Kleibergen-Paap F-stat  | 150.602                     | 1213.452                                  |

# Baseline Results

## Second Stage - Effect of Platform Exposure (Intensive) on Stock Market Participation

$$Y_i = \alpha + \beta \widehat{Platform Exposure}_i + \varepsilon_i$$

| Dependent Var.                       | D(Stock Market Participation) | Equity Holding Ratio (%) |
|--------------------------------------|-------------------------------|--------------------------|
|                                      | (1)                           | (2)                      |
| <i>Platform Exposure<sub>i</sub></i> | 0.025***<br>(7.48)            | 0.742***<br>(5.39)       |
| Obs                                  | 124,586                       | 124,586                  |

# Baseline Results

## Second Stage - Effect of Platform Exposure (Intensive) on Investment Behaviors

| Dependent Var.                       | Fund Balance         | Fund Number        | Fund Type          | Automatic Investment | Allocation Score     | Fund Holding Duration |
|--------------------------------------|----------------------|--------------------|--------------------|----------------------|----------------------|-----------------------|
|                                      | (1)                  | (2)                | (3)                | (4)                  | (5)                  | (6)                   |
| <i>Platform Exposure<sub>i</sub></i> | 234.567***<br>(3.00) | 0.129***<br>(8.70) | 0.034***<br>(5.06) | 0.133***<br>(4.07)   | 21.319***<br>(10.98) | 0.536<br>(1.42)       |
| Obs                                  | 124,586              | 123,686            | 123,438            | 124,586              | 123,688              | 123,340               |

# Baseline Results

## Abnormal Sharpe Ratio After the January Campaign

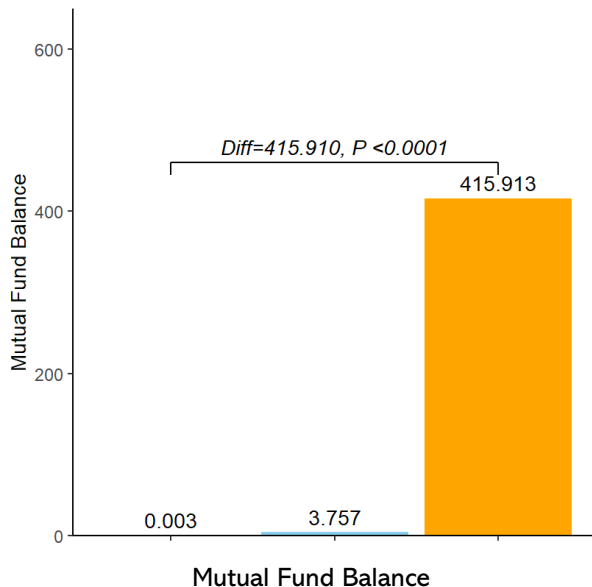
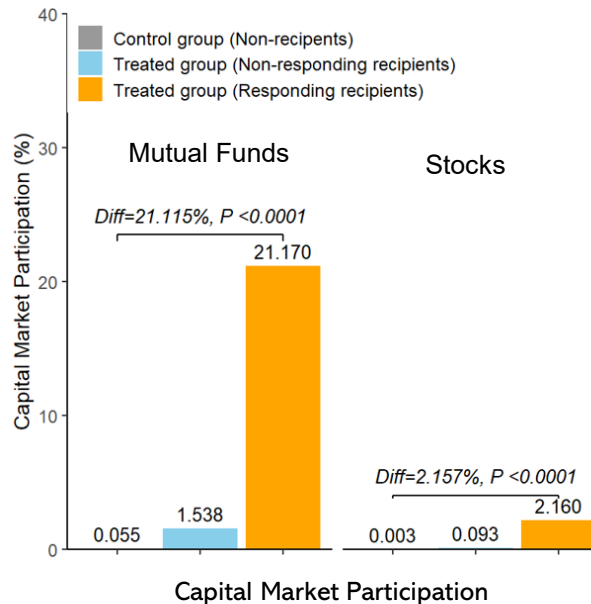
| Dependent Var.                       | Abnormal Sharpe ratio |                    |                    |
|--------------------------------------|-----------------------|--------------------|--------------------|
|                                      | 1-month<br>(1)        | 3-month<br>(2)     | 6-month<br>(3)     |
| <i>Platform Exposure<sub>i</sub></i> | 0.456***<br>(5.53)    | 0.626***<br>(7.64) | 0.551***<br>(6.79) |
| Obs                                  | 123,741               | 123,354            | 122,888            |

# Economic Effects? the Treated and Responded vs the Control

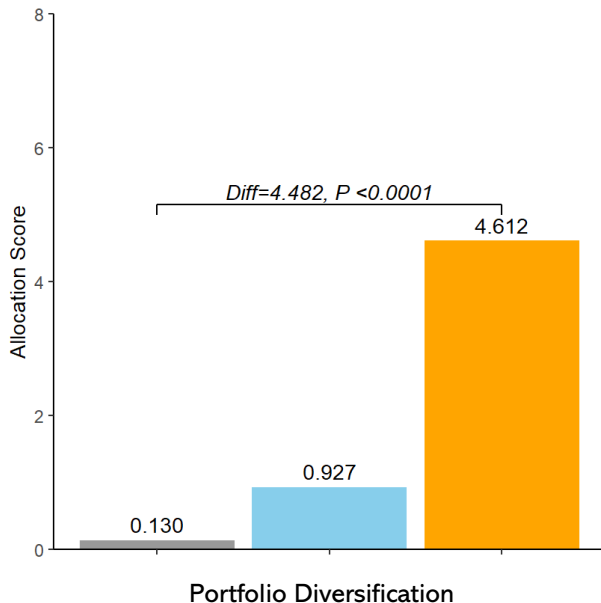
**Treated respondents:** those who **received the nudging message** and then **acquired platform exposure**.

- We compare the impact on these respondents with **those who did not receive the nudging message (control group)**.
- The difference in their behavior → is the effect of nudging-induced information/knowledge acquisition.
- Those who received the message but ignored it or clicked on it without engaging with the financial information services (purely a nudging effect) behaved similarly to the control group.

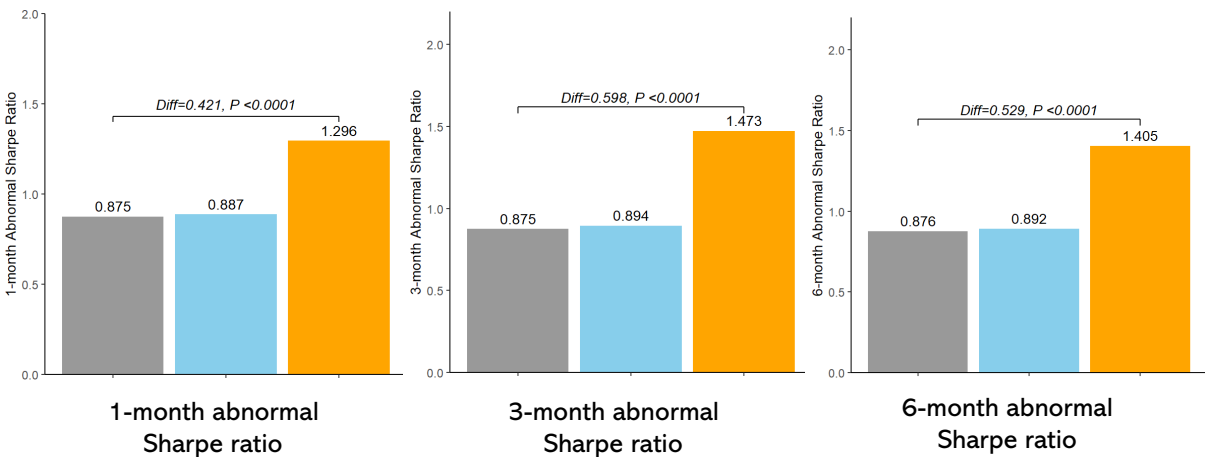
# 1st round, impact on investing in capital markets



# 1st round, impact on portfolio diversification



# Improvements in Investment Performance for the 1<sup>st</sup> Round Treated Respondents

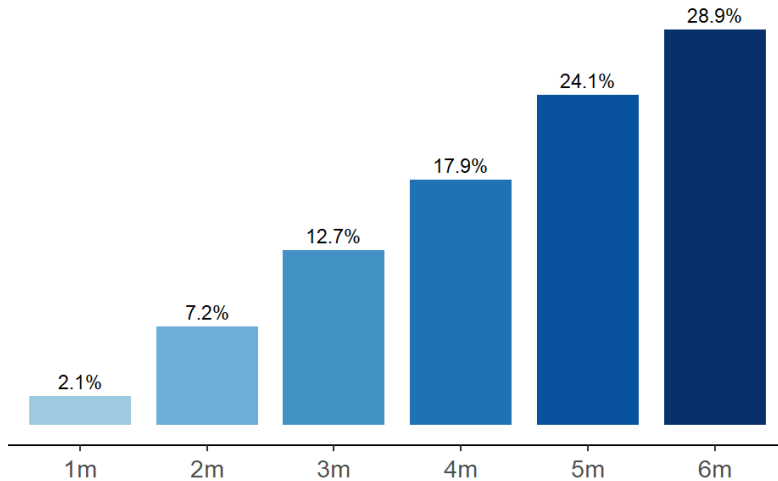


## Nudging result: a rising trend with repeated attempts

Among those receiving the 1<sup>st</sup> attempt, 2.1% stay for 77s on average, median 31s, max 2,859s min 1s;

Among those receiving nudging in two consecutive months (2m), 7.2% stay for 118s on average, median 38s, max 6,385s, min 1s;

Etc.



The vertical axis: the cumulative response rates among the set of recipients who consistently have received the message.

The horizontal axis: the number of repeated monthly nudging

# Economic effectiveness of persisting nudging

Only the first-time respondents (over 6-month repeated nudging):

## 1) 1<sup>st</sup> Respondents: Platform exposure>0

- 2,316 users
- ≈one-third (24%) invested

Panel A.1st-time Respondents (platform exposure>0)

|    | # recipients<br>(no prior<br>response) | #1st-time<br>respondents<br>(%) | # Invested re-<br>spondents(%) | Average<br>Fund Balance | 1-month<br>abnormal SP | 3-month<br>abnormal SP | 6-month<br>abnormal SP |
|----|----------------------------------------|---------------------------------|--------------------------------|-------------------------|------------------------|------------------------|------------------------|
|    | (1)                                    | (2)                             | (3)                            | (4)                     | (5)                    | (6)                    | (7)                    |
| 1m | 62,293                                 | 2.09%                           | 21%                            | 1,965                   | 4.72                   | 4.79                   | 3.72                   |
| 2m | 15,760                                 | 2.66%                           | 26%                            | 1,546                   | 3.04                   | 4.27                   | 3.56                   |
| 3m | 8,443                                  | 3.21%                           | 29%                            | 252                     | 7.32                   | 3.44                   | 1.93                   |
| 4m | 5,154                                  | 2.87%                           | 31%                            | 7,896                   | 4.59                   | 4.51                   | 3.66                   |
| 5m | 3,226                                  | 3.16%                           | 32%                            | 179                     | 5.69                   | 4.19                   | 4.47                   |
| 6m | 2,363                                  | 3.26%                           | 22%                            | 2,956                   | 5.77                   | 2.97                   | 3.25                   |

# Economic effectiveness of persisting nudging

## 2) 1<sup>st</sup> Respondents: Platform exposure>60s

- 772 users
- ≈33% invested

Panel B.1st-time Respondents (platform exposure>60 seconds)

|    | # recipients<br>(no prior<br>response)<br>(1) | #1st-time<br>respondents<br>(%)<br>(2) | # Invested<br>respon-<br>dents(%)<br>(3) | Average<br>Fund<br>Balance<br>(4) | 1-month<br>abnormal SP<br>(5) | 3-month<br>abnormal SP<br>(6) | 6-month<br>abnormal SP<br>(7) |
|----|-----------------------------------------------|----------------------------------------|------------------------------------------|-----------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 1m | 62,293                                        | 0.60%                                  | 30.46%                                   | 3,438                             | 5.62                          | 5.14                          | 4.31                          |
| 2m | 16,279                                        | 0.98%                                  | 31.88%                                   | 1,062                             | 4.69                          | 7.2                           | 5.90                          |
| 3m | 9,035                                         | 1.07%                                  | 42.27%                                   | 778                               | 7.09                          | 4.2                           | 2.31                          |
| 4m | 5,739                                         | 0.89%                                  | 43.14%                                   | 14,446                            | 1.75                          | 1.59                          | 0.46                          |
| 5m | 3,770                                         | 1.25%                                  | 31.91%                                   | 1,599                             | 9.23                          | 7.53                          | 6.59                          |
| 6m | 2,867                                         | 1.60%                                  | 19.57%                                   | 6,938                             | 7.25                          | 6.70                          | 5.41                          |

Panel C.1st-time Respondents (platform exposure∈ (0,60] seconds)

|    | # recipients<br>(no prior<br>response)<br>(1) | #1st-time<br>respondents<br>(%)<br>(2) | # Invested<br>respon-<br>dents(%)<br>(3) | Average<br>Fund<br>Balance<br>(4) | 1-month<br>abnormal SP<br>(5) | 3-month<br>abnormal SP<br>(6) | 6-month<br>abnormal SP<br>(7) |
|----|-----------------------------------------------|----------------------------------------|------------------------------------------|-----------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 1m | 62,293                                        | 1.49%                                  | 17.46%                                   | 937                               | 4.10                          | 4.56                          | 3.28                          |
| 2m | 15,760                                        | 1.82%                                  | 24.74%                                   | 1,722                             | 2.46                          | 3.01                          | 2.41                          |
| 3m | 8,443                                         | 2.36%                                  | 28.14%                                   | 199                               | 8.44                          | 4.19                          | 2.90                          |
| 4m | 5,154                                         | 2.25%                                  | 29.31%                                   | 1,753                             | 5.86                          | 5.37                          | 4.52                          |
| 5m | 3,226                                         | 2.20%                                  | 35.21%                                   | 107                               | 5.12                          | 3.62                          | 3.77                          |
| 6m | 2,363                                         | 2.20%                                  | 25.00%                                   | 3,763                             | 7.02                          | 3.74                          | 4.24                          |

## 3) 1<sup>st</sup> Respondents: Platform exposure (0,60s]

- ≈22% invested

# Heterogeneous Platform Exposure Across Users' Characteristics

A significant proportion of platform users who have not yet engaged in mutual fund investments are **older, less educated, and less wealthy**.

- They are more likely to be financially illiterate, less able to comprehend and manage the risks of investing in stocks, and have fewer investable resources

Hence, we split the sample into three key demographic groups:

1. age (18-24, 25-49, and 50+)
2. education level (without or with college education)
3. investable assets (below or above RMB 50,000)

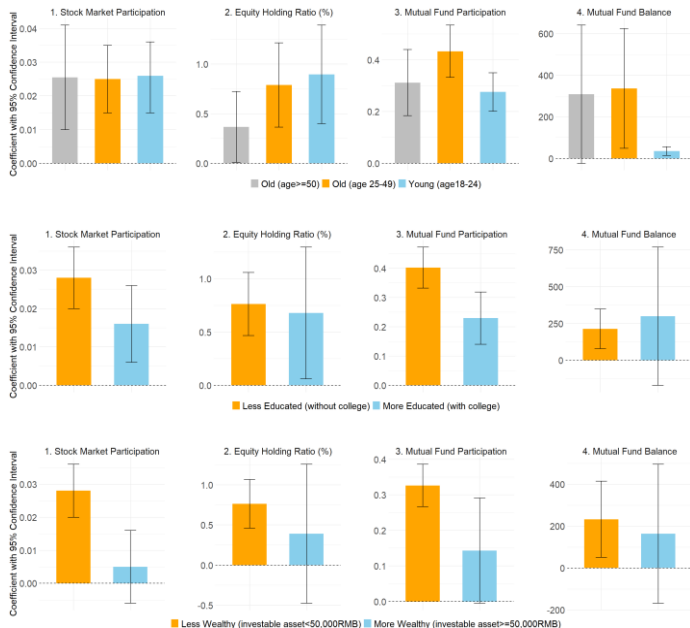
Then, we re-estimate the baseline regressions to examine:

- how the impact of platform exposure differs across user groups

# IV Regression Coefficients: Heterogeneous Incremental Impact on engagement Across Users' Characteristics

## Panel A. Investment Engagement

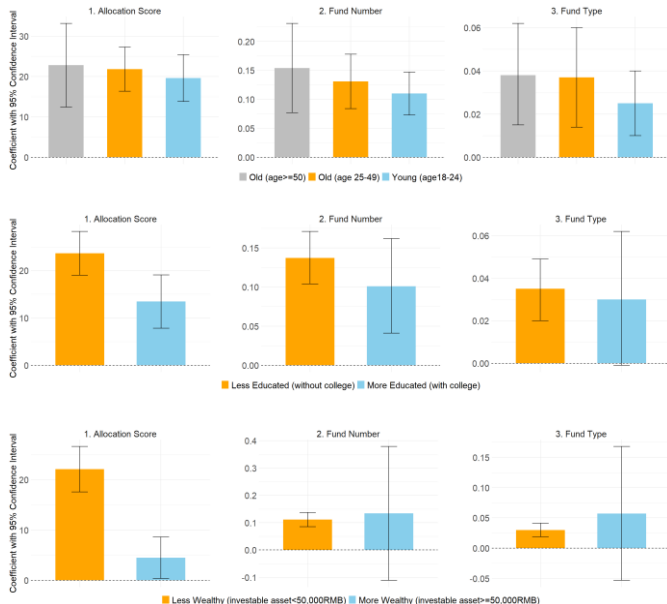
- Instrumentalized exposure robustly  $\uparrow$  all groups' stock market participation, except for wealthier individuals.
- The older, less educated, and less wealthy individuals  $\uparrow$  their participation (stock market & mutual fund), and mutual balances.



# IV Regression Coefficients: Heterogeneous Incremental Impact on Diversification Across Users Characteristics

## Panel B. Portfolio Diversification

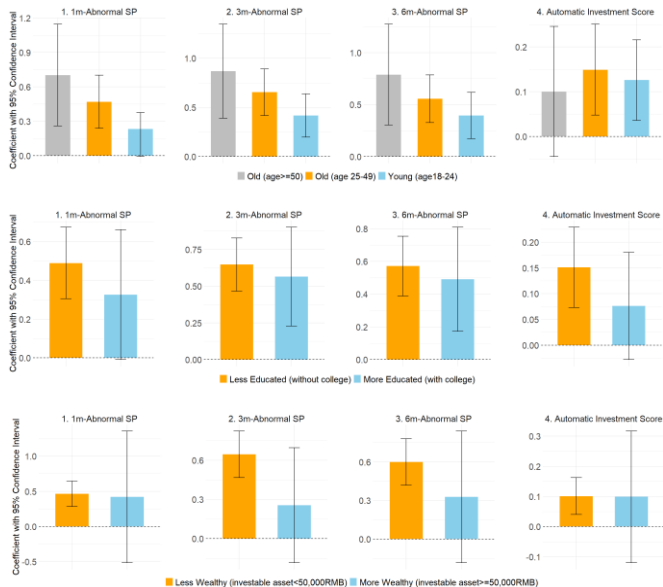
- Digital financial education significantly enhances portfolio allocation capabilities across all demographic groups, except for the wealthier.
- Its effect on portfolio diversification is particularly more pronounced among the older, less educated, and less wealthy individuals.



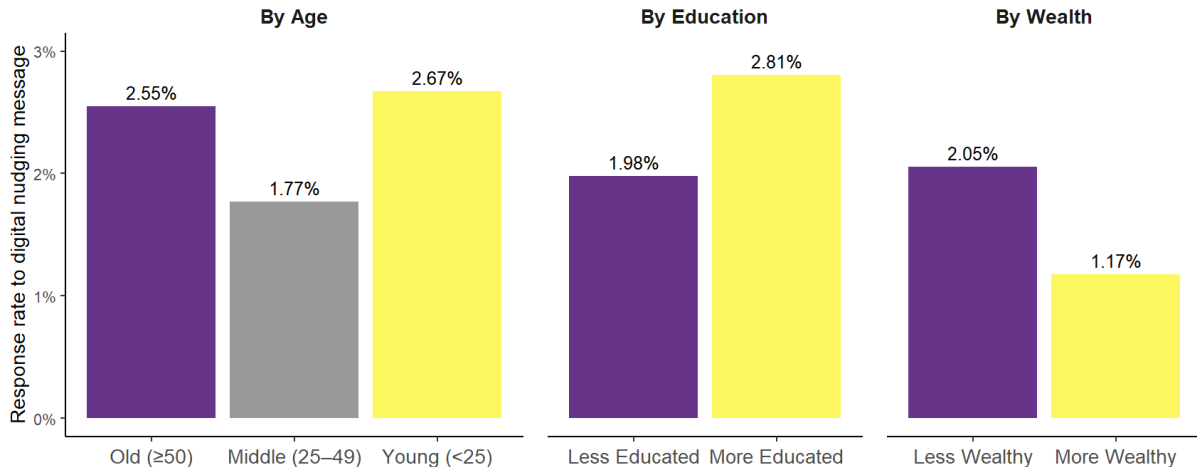
# IV Regression Coefficients: Heterogeneous incremental Impact on Performance Across Users' Characteristics

## Panel C. Investment Performance and the adoption of automatic investment service (automatic monthly transfer of money from one's account to pre-assigned investment funds)

- The older, less educated, and less wealthy show more improvement in investment performance (ASR)
- But the young adopt automatic investment plans more.



# Economic effects: Nudged and Response rate by groups



The older, less educated, and more wealthy are less responsive, still quite similar

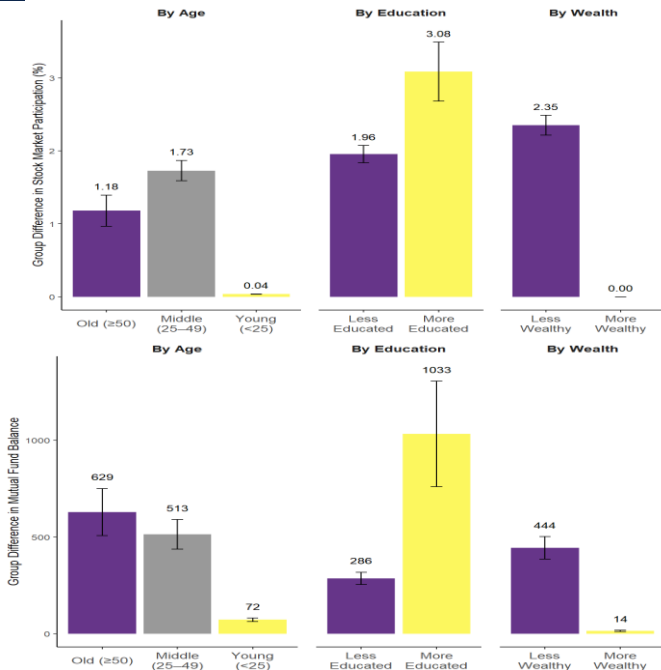
# Only Nudged and Responded: Heterogeneous Economic Impact

## Stock market participation:

- All groups increased, except the wealthier ones.
- The older, more educated, and less affluent ↑ most.

## Mutual Fund Balance:

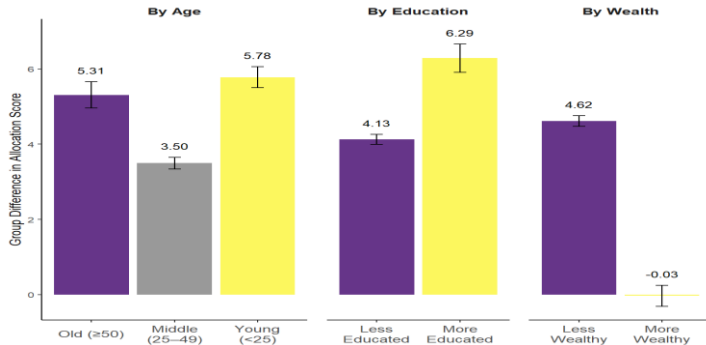
- All groups increased, except the wealthier ones.
- The older, more educated individuals, and less affluent ↑ most.



# Only Nudged and Responded: Heterogeneous Economic Impact

## Portfolio diversification:

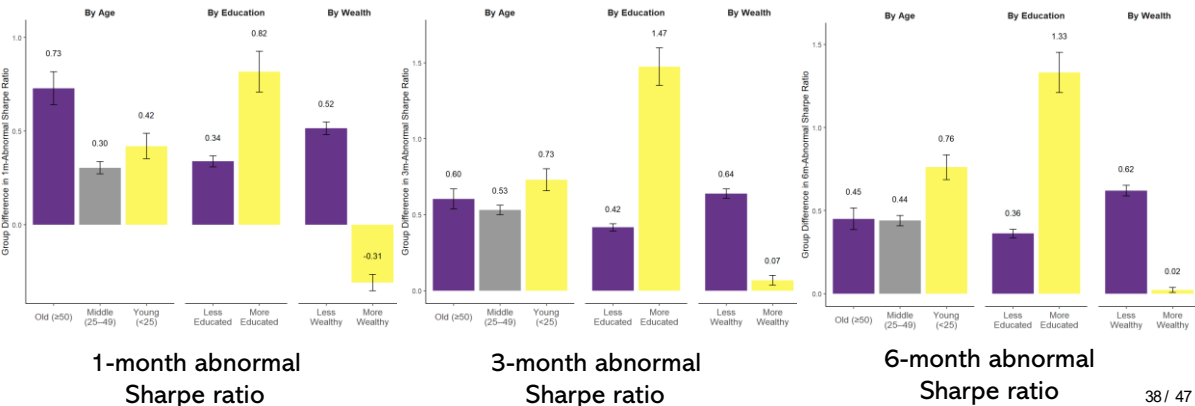
- All increase significantly, except the more affluent, except the wealthier ones



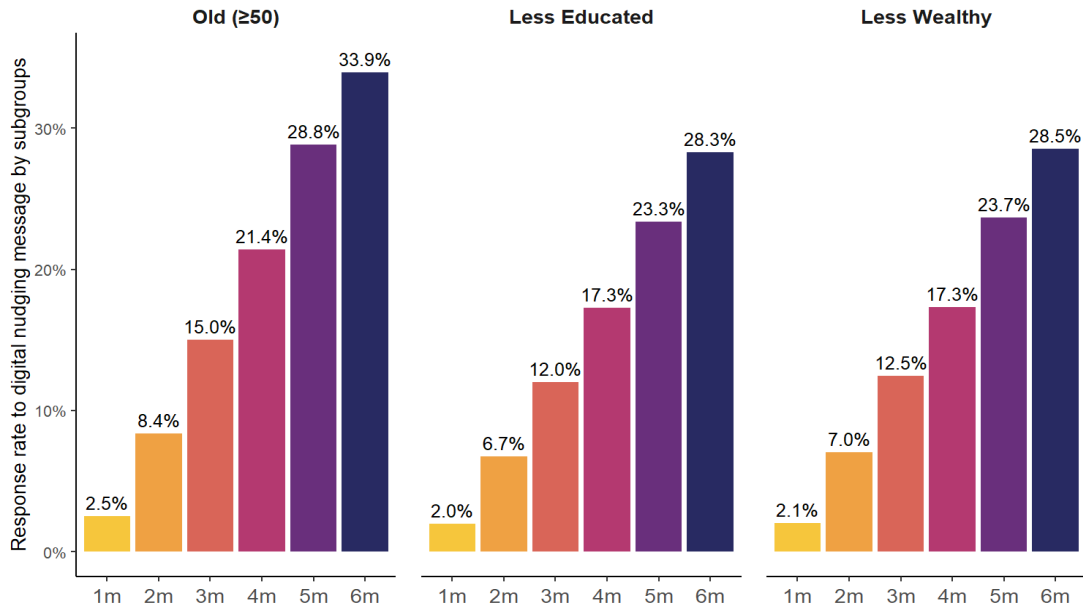
# Only Nudged and Responded: Heterogeneous Economic Impact

## Performance:

- The older, less wealthy, and more educated ↑ performance more in 1-month.
- Over the longer horizon, all groups maintained their investment gains except the wealthy group.



# Response Rate of Persistent Nudging: Older, Less wealthy, less educated



# Economic effectiveness of persisting nudging

**First-time respondents** (over 6-month repeated nudging):

→ **Older, less educated, and less wealthy individuals**

- Consistent with the impact on all first-time respondents
- Older respondents are more likely to make mutual fund investments and larger mutual fund balances, possibly due to their higher investment capacity.

|                   | #1st-time<br>respondents<br>(1) | # Invested re-<br>spondents(%)<br>(2) | Average<br>Fund Balance<br>(3) | 1-month<br>abnormal SP<br>(4) | 3-month<br>abnormal SP<br>(5) | 6-month<br>abnormal SP<br>(6) |
|-------------------|---------------------------------|---------------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|
| All               | 2,316                           | 24.22%                                | 2,466                          | 5.19                          | 4.03                          | 3.43                          |
| Old ( $\geq 50$ ) | 434                             | 23.04%                                | 5,755                          | 6.14                          | 4.50                          | 3.54                          |
| Less Educated     | 1,929                           | 23.54%                                | 1,794                          | 4.56                          | 3.84                          | 3.09                          |
| Less Wealthy      | 1,872                           | 22.49%                                | 2,335                          | 5.58                          | 4.63                          | 3.74                          |

# Conclusions

- Digital platforms host capital market products, with low entry barriers and low transaction costs
- Digital platforms can connect uninitiated households with the investor community, delivering current financial knowledge and financial product information.
- Results = enhances households' capital market participation, diversified, and good risk-adjusted returns (positive Abnormal Sharpe Ratios).
- The effect is also pronounced among older, less educated, and less wealthy individuals.
- Policy implications: Transmitting financial knowledge to capital market investing via digital platforms is a low-cost, scalable, and impactful alternative to traditional approaches. This is particularly important given
  - the prevalence of low stock market participation
  - widespread lack of financial literacy globally

# Thank You!

Any questions?

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Bernard Yeung: [byeung@nus.edu.sg](mailto:byeung@nus.edu.sg)

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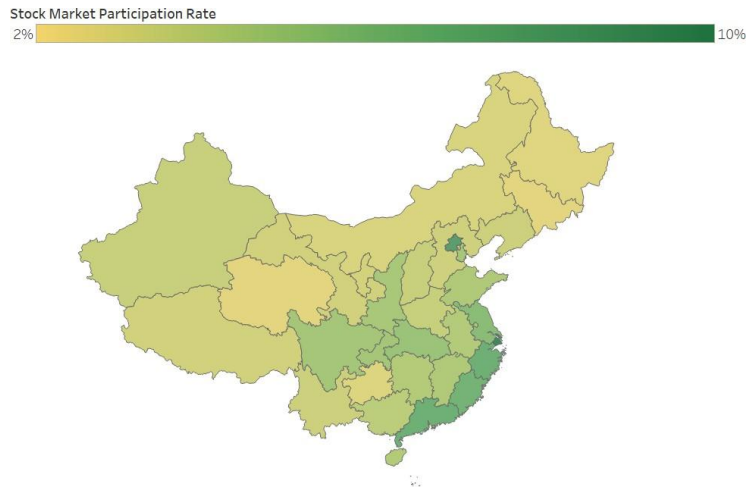
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# Appendix

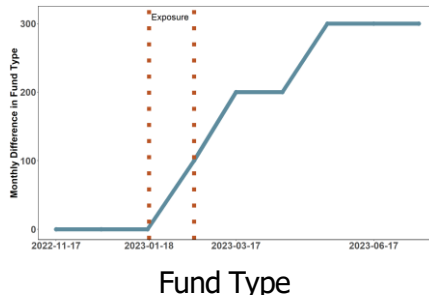
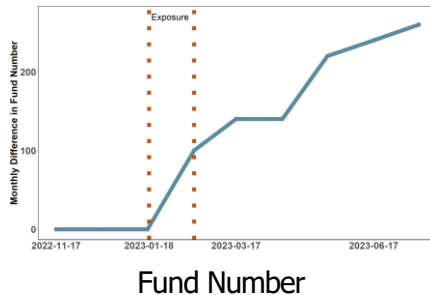
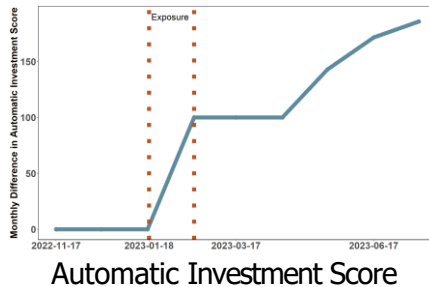
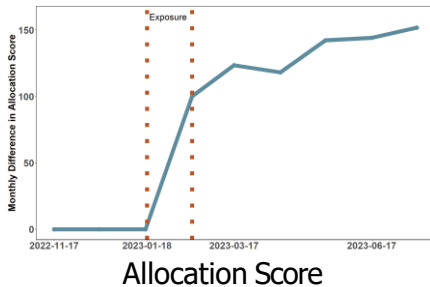
## Stock Market Participation Rate of Platform Users



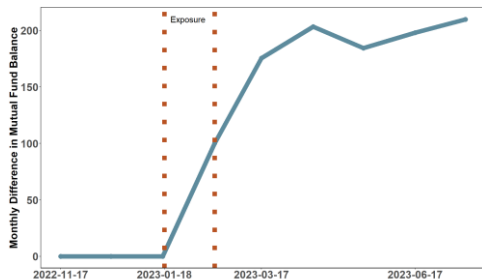
Source: All calculations are based on data obtained from the platform we analyzed.

# Appendix

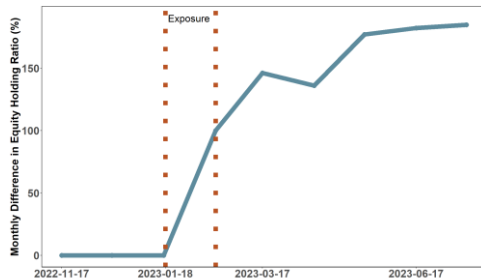
## Matched Sample - Parallel Trend in Investment outcomes



## Matched Sample - Parallel Trend in Investment outcomes



Fund Balance



Equity Holding Ratio

# Appendix

## Second Stage - Effect of Platform Exposure (Extensive) on Stock Market Participation

$$Y_i = \alpha + \beta \widehat{1\{PlatformExposure\}}_i + \varepsilon_i$$

| Dependent Var.                      | D(Stock Market Participation) | Equity Holding Ratio (%) |
|-------------------------------------|-------------------------------|--------------------------|
|                                     | (1)                           | (2)                      |
| $\widehat{1\{PlatformExposure\}}_i$ | 0.066***<br>(8.79)            | 1.924***<br>(5.87)       |
| Obs                                 | 124,586                       | 124,586                  |

# Appendix

## Second Stage - Effect of Platform Exposure (Extensive) on Investment Behaviors

| Dependent Var.                     | Fund<br>Balance<br>(1) | Fund<br>Number<br>(2) | Fund<br>Type<br>(3) | Automatic<br>Investment<br>(4) | Allocation<br>Score<br>(5) | Fund Holding<br>Duration<br>(6) |
|------------------------------------|------------------------|-----------------------|---------------------|--------------------------------|----------------------------|---------------------------------|
| $\mathbb{1}\{PlatformExposure\}_i$ | 608.091***<br>(3.07)   | 0.299***<br>(11.84)   | 0.075***<br>(5.50)  | 0.344***<br>(4.23)             | 49.307***<br>(27.38)       | 1.109<br>(1.44)                 |
| Obs                                | 124,586                | 123,686               | 123,438             | 124,586                        | 123,688                    | 123,340                         |

## Second Stage - Effect of Platform Exposure (Extensive) on Investment Performance

| Dependent Var.                     | Abnormal Sharpe ratio |                    |                    |
|------------------------------------|-----------------------|--------------------|--------------------|
|                                    | 1-month<br>(1)        | 3-month<br>(2)     | 6-month<br>(3)     |
| $\mathbb{1}\{PlatformExposure\}_i$ | 1.058***<br>(6.04)    | 1.583***<br>(9.80) | 1.405***<br>(8.29) |
| Obs                                | 123,741               | 123,354            | 122,888            |

# Impacts of Platform Exposure Components

The platform exposure has several components:

- Personalized Robo-Advisor (PRA)
- three subcomponents of Wealth Community:
  1. Wealth Forum
  2. Visual Content
  3. Other

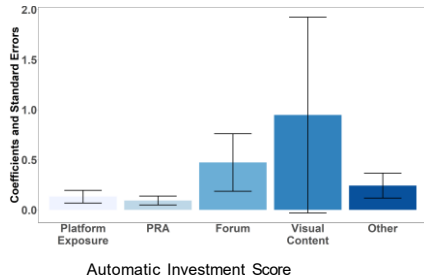
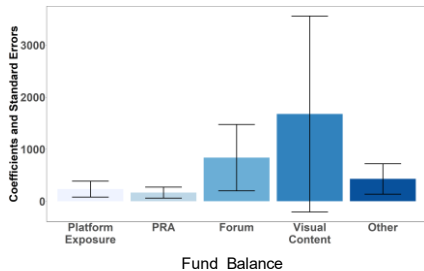
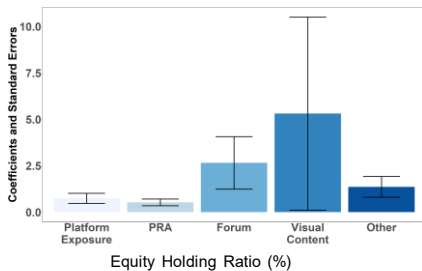
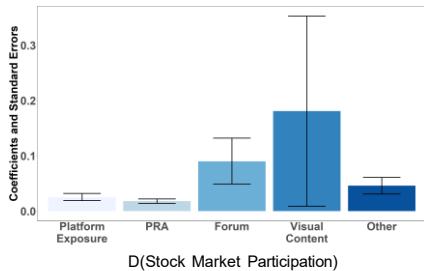
We further investigate the impact of these components on users' investment decisions:

- First, we standardize these components to a scale of 0 to 100 for comparability.
- Then, we repeat the previous 2SLS equations using these platform exposure components:

$$\text{First Stage : } \text{Components}_i = \alpha + \theta 1\{\text{Nudge}\}_i + \varepsilon_i$$

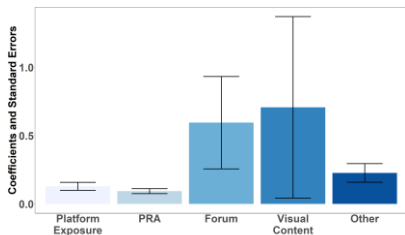
$$\text{Second Stage : } Y_i = \alpha + \beta \widehat{\text{Components}}_i + \varepsilon_i$$

# Heterogeneous Impact of Platform Exposure Components

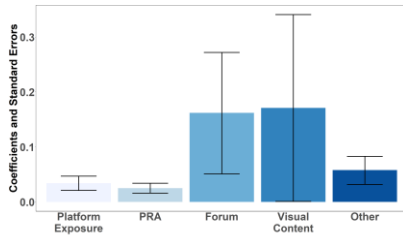


- All channels → investment engagement ↑ + Automatic Investment ↑
- "Visual Content" has a greater impact than all other components.

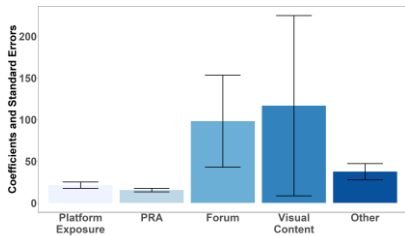
# Heterogeneous Impact of Platform Exposure Components



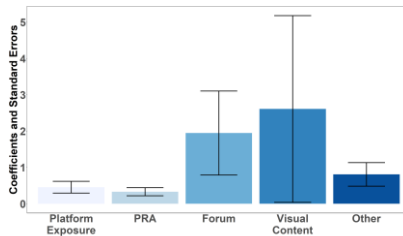
Fund Number



Fund Type



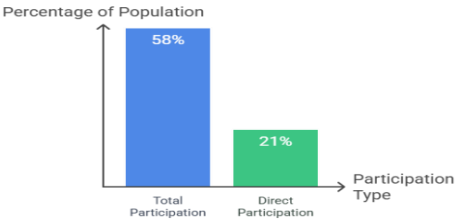
Allocation Score



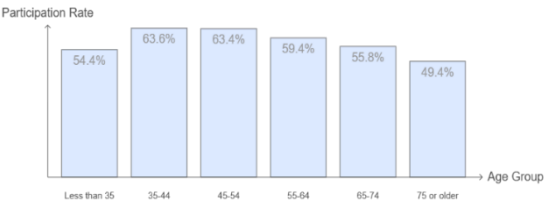
Abnormal SP

- All channels → portfolio diversity ↑ (“Visual Content” has a significantly greater impact.)

# Still, Low Stock Market Participation & Disparity - US

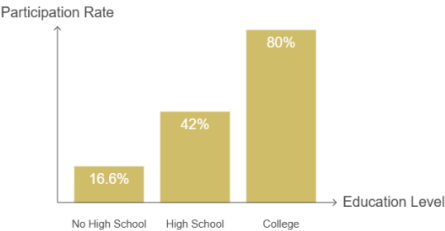


Stock Market Participation in USA (2022)

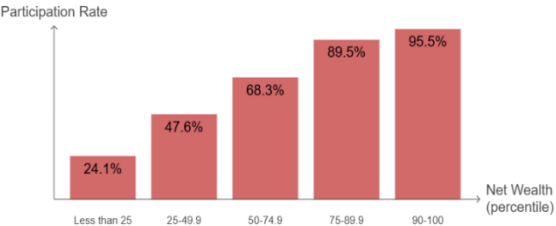


By Age

**Even in the US, the non-participation rate exceeds 40%, and expectedly the older, less educated, and less wealthy participate less.**



By Education Level



By Wealth Group

# Stock Market Participation Puzzle

Households could benefit much from investing in financial markets, holding well-diversified portfolios. However, the majority did not (Campbell [2006](#))

The literature has suggested several factors that constrain SMP:

- i. Income and Wealth Levels (Briggs et al. [2021](#); Haliassos and Bertaut [1995](#))
- ii. Social and Peer Effects (Brown et al. [2008](#); Hong, Kubik, and Stein [2004](#); Kaustia and Knüpfer [2012](#))
- iii. Institutional and Cultural Factors (Giannetti and Wang [2016](#); Guiso, Sapienza, and Zingales [2006](#))
- iv. Behavioral Biases and Preference (Barber and Odean [2001](#); Ben-David and Hirshleifer [2012](#); Guiso, Sapienza, and Zingales [2008](#))
- v. Cognitive ability (Christelis, Jappelli, and Padula [2010](#); Grinblatt, Keloharju, and Linnainmaa [2011](#))
- vi. Entry barrier: transaction and information costs & market frictions: Calvet, Campbell, and Sodini [2007](#); Duraj et al. [2024](#); Hvide et al. [2024](#); Vissing-Jørgensen [2002](#)
- vii. The Lack of Financial Literacy and Knowledge Kimball and Shumway [2010](#); Lusardi, Michaud, and Mitchell [2017](#); Lusardi and Mitchell [2014](#); Van Rooij, Lusardi, and Alessie [2011](#)

# This paradox highlights that

## **Key barriers to capital market participation:**

- Behavioral inertia: Calvet et al. (2009), Madrian and Shea (2001), Merkoulova and Veld (2022), Thaler (2015)
- limited financial literacy: Kimball and Shumway (2010), Lusardi, Michaud, and Mitchell (2017), Lusardi and Mitchell (2014), Van Rooij, Lusardi, and Alessie (2011)

**Particularly among** older, less educated, and less wealthy individuals