# Pourquoi les ménages détiennent-ils si peu d'actions : l'influence des réseaux


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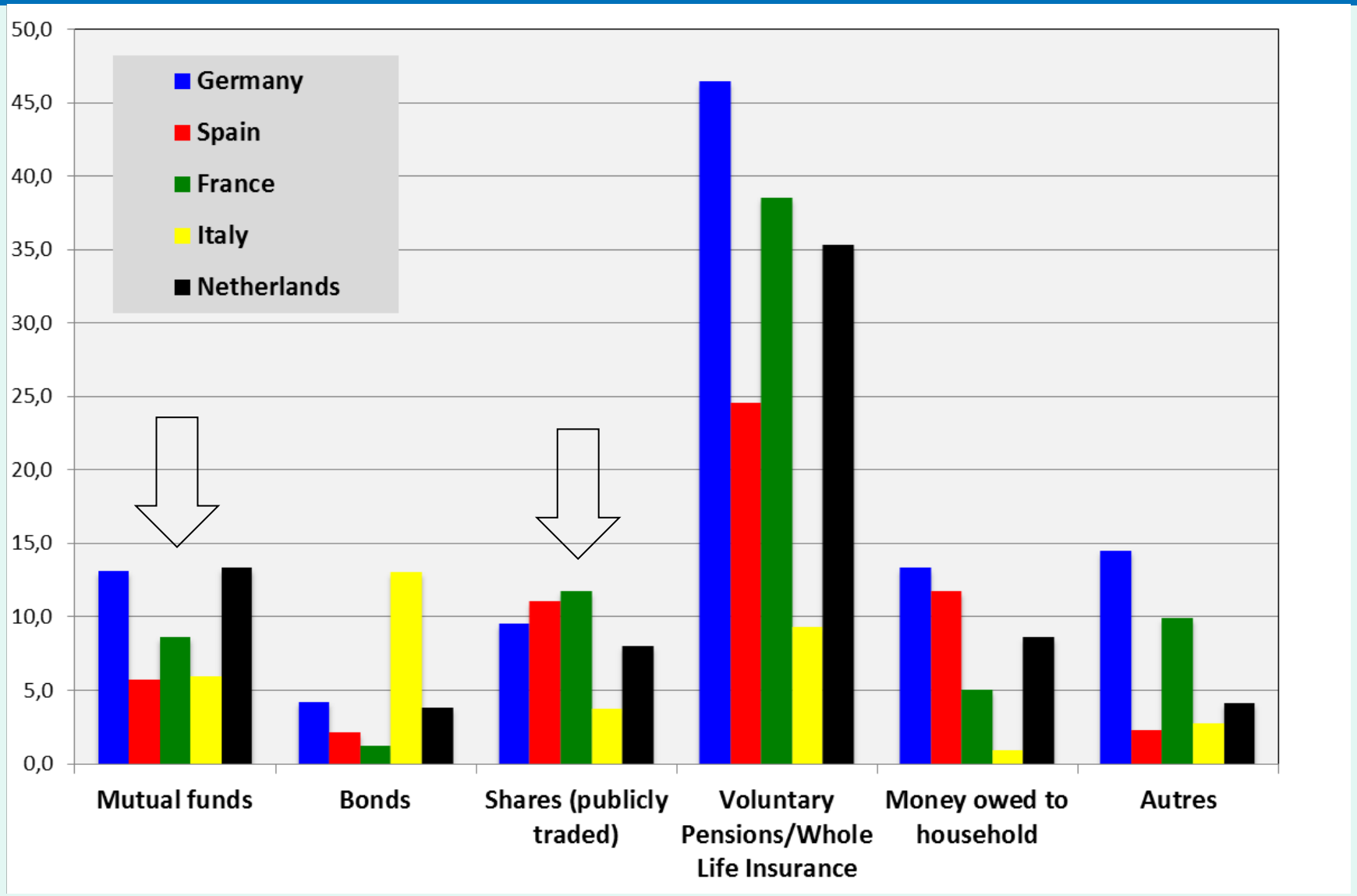
# Participation in Financial Assets, HFCS 2013-2014
# Stock participation puzzle



# Risky financial asset ownership in the zone €
## per level of net wealth (2010)

| | Quintiles de patrimoine net | | | | | Top 5% | Actifs financiers risqués |
|---|---|---|---|---|---|---|---|
| | *1er* | *2nd* | *3ème* | *4ème* | *5ème* | | |
| Euro zone | 3,1 | 13,0 | 17,0 | 23,7 | 44,2 | 55,0 | 20,2 |
| Autriche (A) | 2,4 | 4,4 | 13,8 | 18,5 | 33,8 | 38,9 | 14,6 |
| Belgique (BE) | 4,8 | 18,6 | 25,7 | 38,8 | 65,7 | 72,8 | 30,7 |
| Chypre (CY) | 18,1 | 24,3 | 35,3 | 41,7 | 62,4 | 77,6 | 36,3 |
| Allemagne (DE) | 3,5 | 9,0 | 27,1 | 28,0 | 47,5 | 55,7 | 23,0 |
| Espagne (ES) | 1,8 | 5,1 | 9,3 | 17,8 | 36,2 | 48,6 | 14,0 |
| Finlande (FI) | 14,6 | 29,7 | 36,1 | 45,7 | 67,4 | 81,7 | 38,7 |
| France (FR) | 3,0 | 10,9 | 19,1 | 27,9 | 47,5 | 63,8 | 21,7 |
| Grèce (GR) | 0,4 | 1,1 | 1,6 | 3,9 | 12,8 | 22,8 | 4,0 |
| Italie (IT) | 1,0 | 11,1 | 14,4 | 28,6 | 44,0 | 53,6 | 19,8 |
| Luxemb. (LU) | 4,6 | 17,4 | 21,3 | 31,8 | 54,4 | 65,6 | 25,8 |
| Malte (MT) | 10,8 | 17,9 | 30,4 | 48,6 | 60,7 | 61,8 | 33,7 |
| Pays-Bas (NL) | 7,8 | 12,4 | 23,9 | 29,7 | 45,8 | 60,3 | 23,9 |
| Portugal (PT) | 0,9 | 1,4 | 4,0 | 6,5 | 19,9 | 37,6 | 6,5 |
| Slovénie (SI) | 9,8 | 11,6 | 15,3 | 27,4 | 37,9 | 55,0 | 20,3 |
| Slovaquie (SK) | 1,6 | 2,2 | 3,9 | 5,2 | 7,6 | 11,8 | 4,1 |

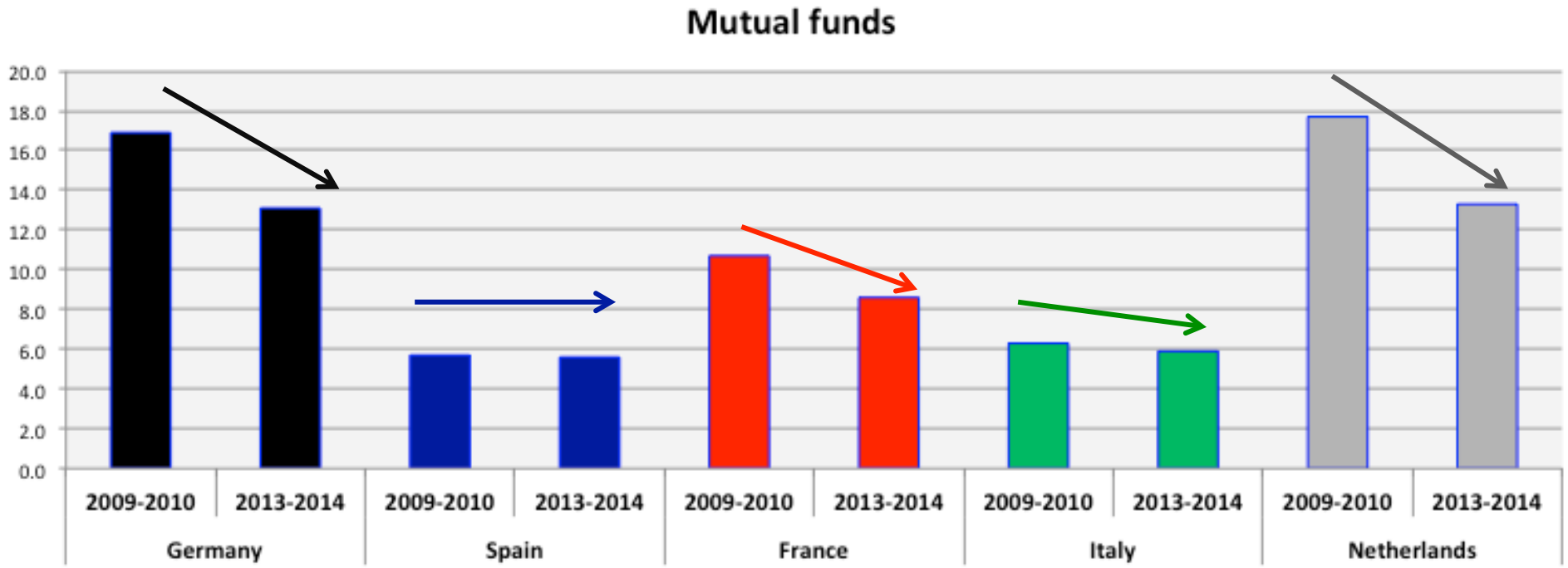
Issue: rise overall stockholding or only stock investment in wealthy portfolios?

55.0% zone €
63.8% France

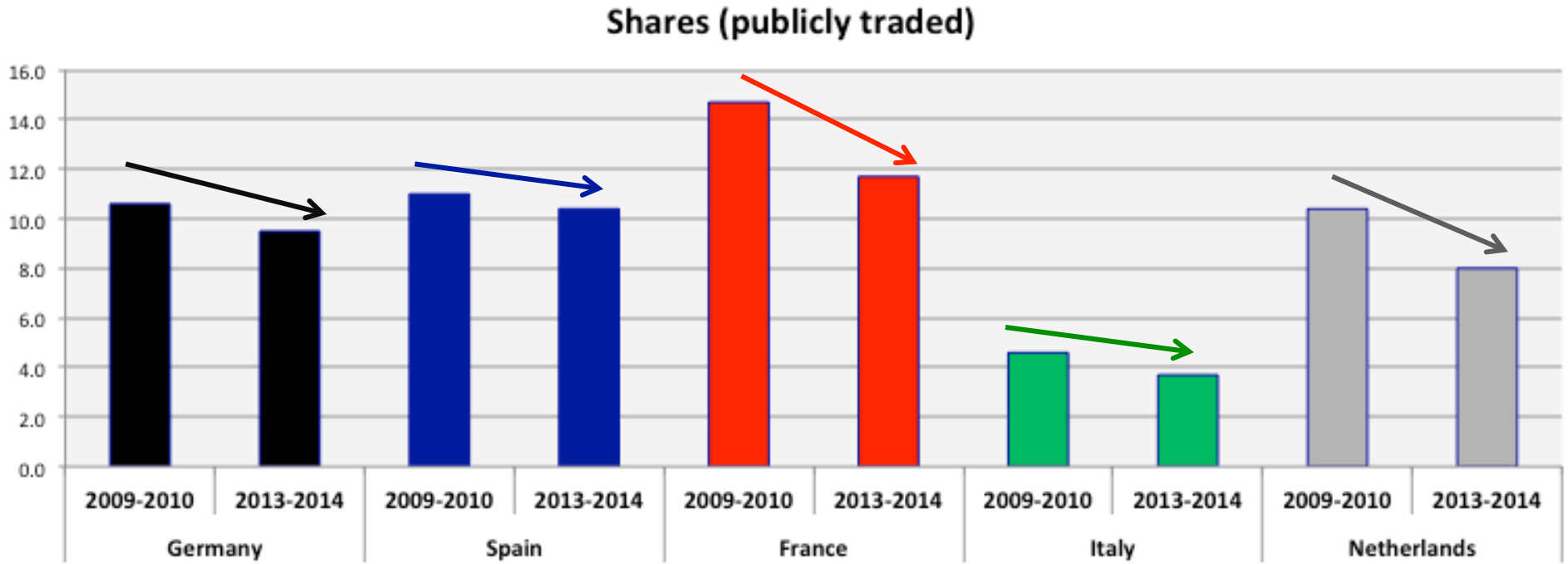
France in an average position in the Eurozone concerning wealth

**Source: Household finance & consumption survey (HCFS) 2010**

# Participation in Mutual funds
# HFCS two waves (2009-2010 & 2013-2014)



# Participation in shares, HFCS two waves (2009-2010 & 2013-2014)



# Insee: Household asset ownership in 2010 & 2014 according to the level of financial wealth

**3.4a. Taux de détention des valeurs mobilières et des assurances vie par niveau de richesse financière**

| Percentiles | Actions en direct | FCP-Actions | Obligation ou FCP-Obligation | Autres valeurs mobilières | Ass. Vie multi-support | Ass. Vie en euros | Bons de Capitalisation |
|---|---|---|---|---|---|---|---|
| 0-25 | 0.004 | 0.002 | 0.000 | 0.001 | 0.010 | 0.054 | 0.000 |
| 25-50 | 0.041 | 0.010 | 0.001 | 0.003 | 0.047 | 0.165 | 0.001 |
| 50-70 | 0.105 | 0.028 | 0.011 | 0.024 | 0.096 | 0.265 | 0.004 |
| 70-90 | 0.256 | 0.085 | 0.038 | 0.029 | 0.215 | 0.411 | 0.007 |
| 90-99 | 0.492 | 0.184 | 0.100 | 0.078 | 0.427 | 0.478 | 0.016 |
| 99-100 | 0.690 | 0.374 | 0.195 | 0.115 | 0.610 | 0.563 | 0.039 |
| **Ensemble** | **0.135** | **0.046** | **0.021** | **0.020** | **0.121** | **0.239** | **0.004** |

**2010**

**Stocks ↓ (3.5% direct)**
but see top 1%

**Life insurance: unit → euros ↑ 2.3%**

**3,4. Taux de détention des valeurs mobilières et des assurances vie par niveau de richesse financière**

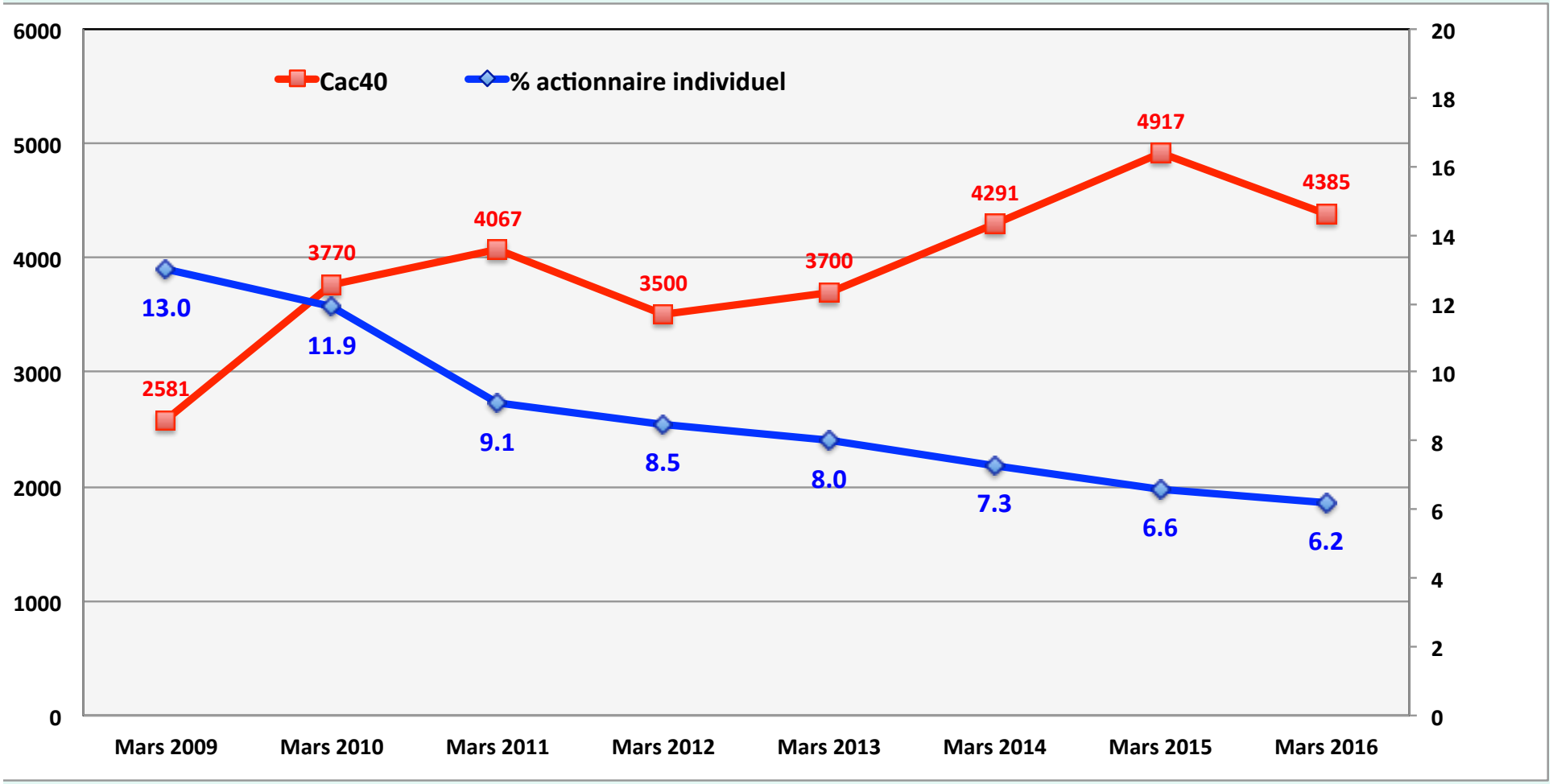
| Percentiles | Actions en direct | FCP-Actions | Obligation ou FCP-Obligation | Autres valeurs mobilières | Ass. Vie multi-support | Ass. Vie en euros | Bons de Capitalisation |
|---|---|---|---|---|---|---|---|
| 0-25 | 0.004 | 0.002 | 0.000 | 0.002 | 0.013 | 0.059 | 0.000 |
| 25-50 | 0.038 | 0.005 | 0.002 | 0.005 | 0.034 | 0.173 | 0.000 |
| 50-70 | 0.069 | 0.027 | 0.007 | 0.006 | 0.099 | 0.303 | 0.002 |
| 70-90 | 0.174 | 0.045 | 0.025 | 0.019 | 0.216 | 0.421 | 0.004 |
| 90-99 | 0.361 | 0.122 | 0.063 | 0.040 | 0.433 | 0.585 | 0.008 |
| 99-100 | 0.724 | 0.266 | 0.174 | 0.029 | 0.585 | 0.621 | 0.084 |
| **Ensemble** | **0.099** | **0.030** | **0.014** | **0.010** | **0.120** | **0.262** | **0.003** |

**2014**



**Source: Insee, enquêtes « Patrimoine »**

# Direct individual stockholding in France: continuous decline at least until March 2016




**Source: Tns-Sofia** (13.8% in December 2008)

# Standard model of portfolio choice

- Investment choice between:
  - a risky asset: expected return $m$ & standard deviation $\sigma$
  - & a safe asset of return $r$
- Expected utility: share of risky asset $p$ ➔ $p = (m–r) / \sigma^2\gamma$ .
  Depend on:
  - Preferences: relative risk aversion $\gamma$
  - Price expectations concerning the risky asset ($m$, $\sigma$) – or even the riskless asset ($r$)
- If background risk on labor income added: share $p$ lower if the saver is ‘temperant’ (substitution of risks)
  - If present risk exposition in labor income increases, the share $p$ decreases (if the saver is temperant: 4$^{th}$ derivative of the felicity function)

# Behaviors, preferences & expectations

- Preferences towards risk, time & (family) transmission
  - Inherited from the past (childhood, experience…)
- Present available resources
  - "Cash in hand" (income & wealth)
  - Present liquidity constraints, unemployment, perceived exposition to risk
  - Capitals: health, education…
  - Ability (may be improved by financial literacy?) & cognitive capacity

Level of information

- Expectations & beliefs about the future
  - Economic expectations: *future labor income*, *prob. of unemployment*; *risk & return of* real estate & *financial assets*, liquidity constraints
  - Self expectations: future tastes, health, survival probabilities
  - 'Social' expectations: future (of) retirement benefits & Welfare State

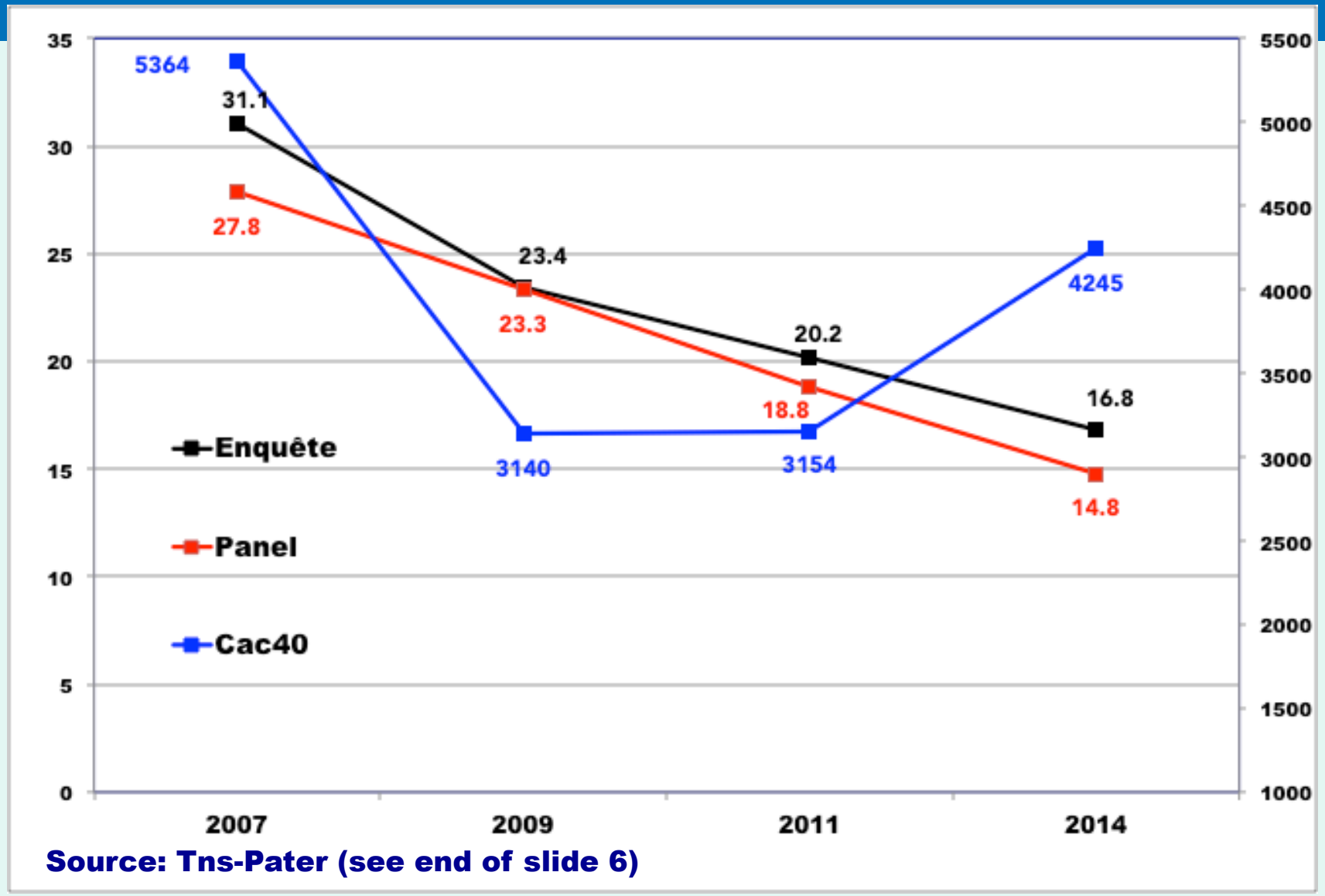
# Explain the stock participation puzzle

- Factors that reduce attractiveness of stocks relative to bonds
  - **Fixed entry (and participation) costs only for stocks**
    - Expected stock payoffs have to overcome this hurdle: Haliassos and Bertaut (1995), Vissing Jorgensen (2002), Haliassos and Michaelides (2003), Gomes and Michaelides (2005)
    - Fagereng, Gottlieb, Guiso (2016): rather large risk aversion, small participation cost plus small probability of major loss generate hump-shaped participation with exit at retirement; and initially flat and subsequently diminishing portfolio share.
  - **Factors limiting expected-return attractiveness**
    - **Interest rate wedge:**
      - Davis, Kubler, Willen (2006): stocks not a good deal if you have to borrow
    - **Subjective expectations:**
      - Dominitz and Manski (JEEA 2007): Many people don't agree on equity premium
    - **Trust**
      - Guiso, Sapienza, Zingales (JF 2008): probability of getting cheated with stocks
    - **Possibility of disasters**
      - Alan (QE 2008): big recession coupled with stock market crash
- Factors that prevent the agent from considering the full asset menu
  - **Asset ignorance:** Guiso and Jappelli (2005)
  - **Financial illiteracy:** Lusardi and Mitchell (2007), Alessie, Lusardi, van Rooij (JFE), Jappelli and Padula (2015)
  - **Narrow framing:** Barberis, Huang, Thaler (2006)

# Explain the stock participation puzzle

Several theoretical papers suggest that ambiguity aversion can explain these puzzles, based on the assumption that investors view stock returns as ambiguous. Bossaerts, Ghirardato, Guarnaschelli, and Zame (2010), Cao, Wang, and Zhang (2005), Dow and Werlang (1992), Easley and O'Hara (2009), and Epstein and Schneider (2010), among others, show that ambiguity aversion can cause nonparticipation.[2] Garlappi, Uppal, and Wang (2007) and Peijnenburg (2014) show that ambiguity aversion can reduce the fraction of financial assets allocated to equity.

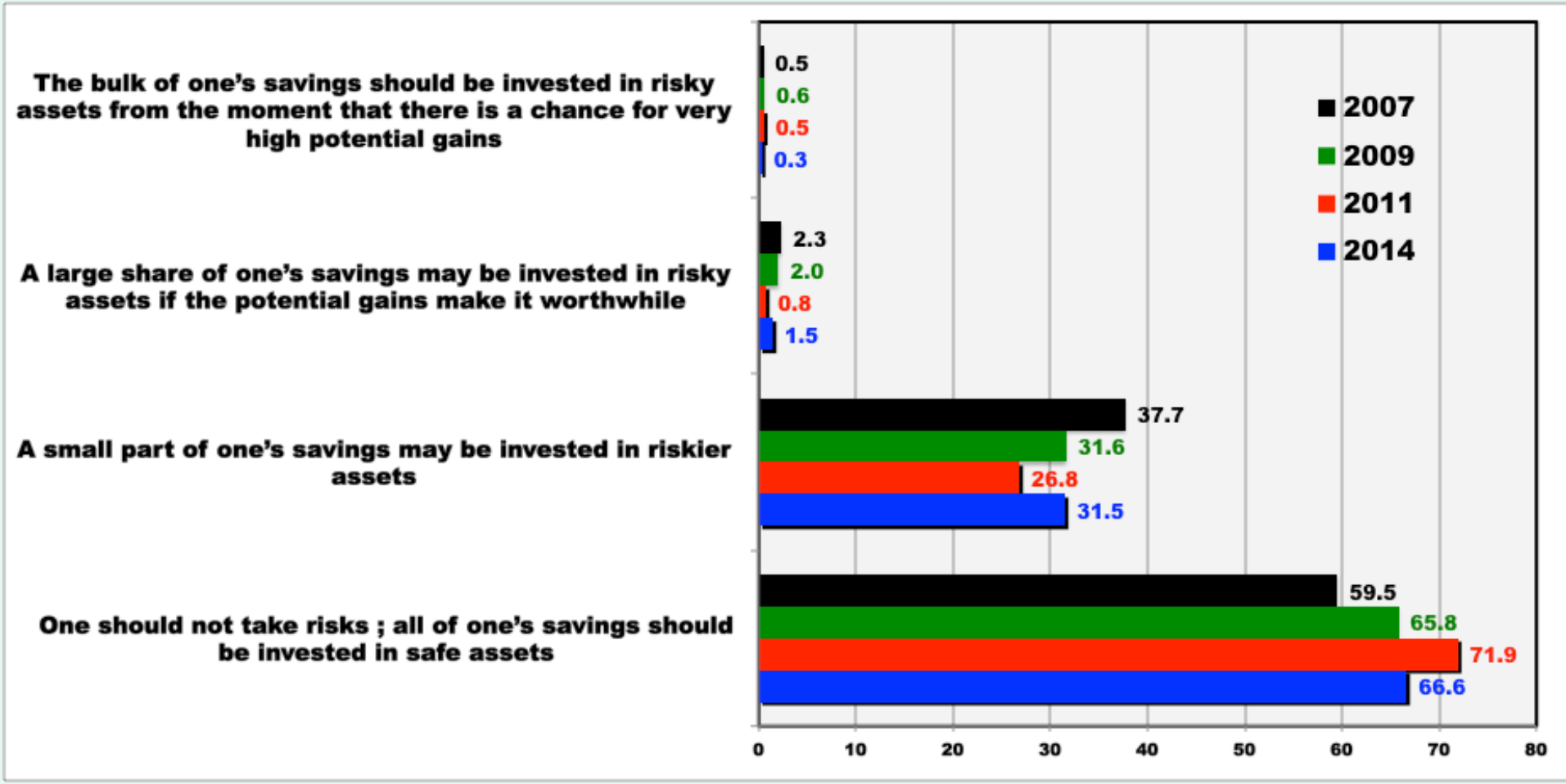
# Household (direct or indirect) stockholding, 2007-2014 France Pater survey (panel dimension)




**Source: Tns-Pater (see end of slide 6)**

# « As regards financial investments, do you think that… »

## Pater 2007, 2009 2011 & 2014 (panel) : in % (N = 807)




2014: return to 2009

# Explaining the drop in stockholding after 2013-2014

- Factors that may explain the drop in stock ownership until 2012:
  - demand: more pessimistic & ambiguous stock price expectations;
    Δ current resources; (but not more risk aversion)
  - supply: heavier (relative) taxation of stocks, 'livret A' opening, etc.

  cease to act after 2012 or even play in the opposite direction…
- For a rise in stock ownership after 2012 or 2013
  - Intentions of investment strategies in 2014: back to 2009 **=> see graph**
- The puzzle: as much supply than demand / financial education?
  - French savers ready but supply & professional advice do not follow??
  - Fewer issues of shares: privatizations drop in 2007-2012 but rise in 2013 (& the weight of foreign shareholders in listed companies is high: 42%)
  - Advice offers little (less & less?) oriented to direct stockholding?
    - Some evidence of that?

# Informative Social Interactions

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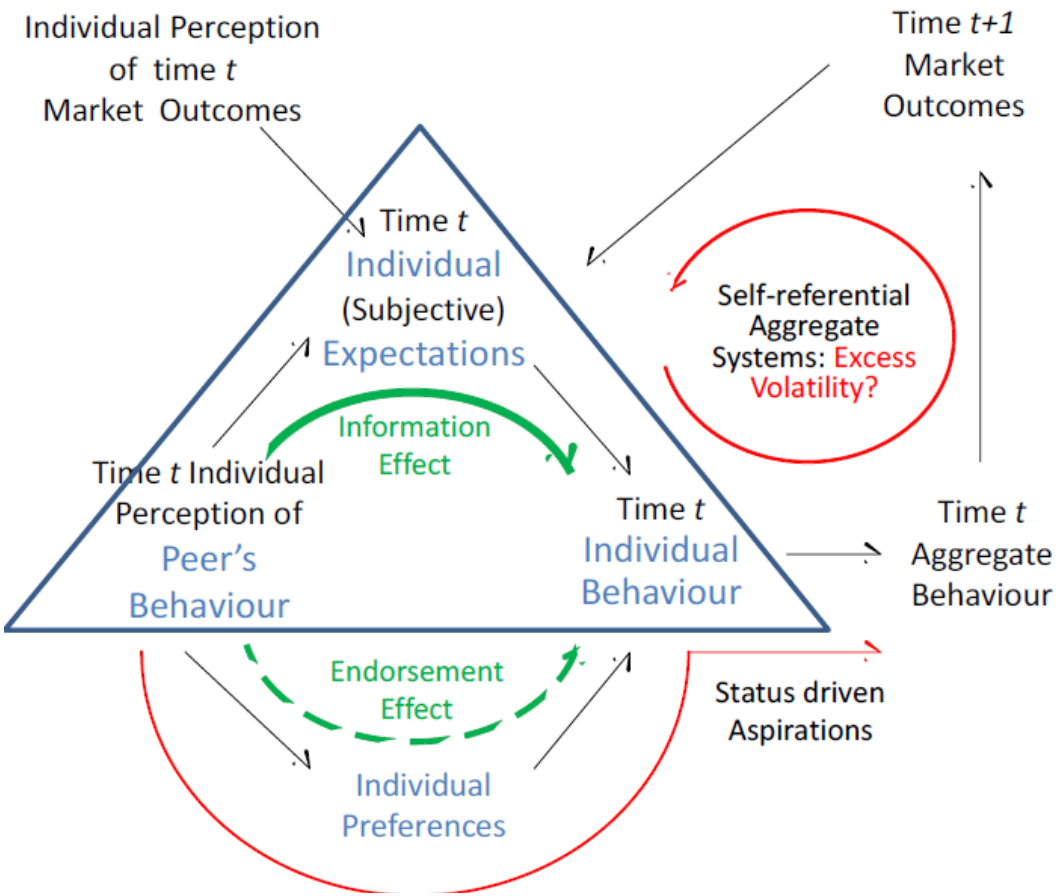
**AMF**

# Question and Motivation

- *Do social interactions matter for financial behaviour?* i.e.
  - How does **information from others** about the stock market affect own stock holding decisions?
  - How does stock market **participation of others** influence own stock holding decisions?
  - What do people get out of social interactions?
- Why do we care?
  - 2008 subprime mortgage crisis: Is there a role for **social interactions** in the spread of (*poor*) financial behavior?
  - Important for (i) efficient dissemination of information on financial products/assets, (ii) designing and regulating successful/'fashionable' on-line investment clubs, and (iii) overcoming financial literacy limitations in the population, potentially responsible for (iv) booms and busts in asset markets,
  - ex. 'Excess volatility puzzle': Do **social interactions** contribute? How?

# What do We Do

We design and collect novel primary data, and find that **social interactions** affect individual stock market decisions by being **informative:**



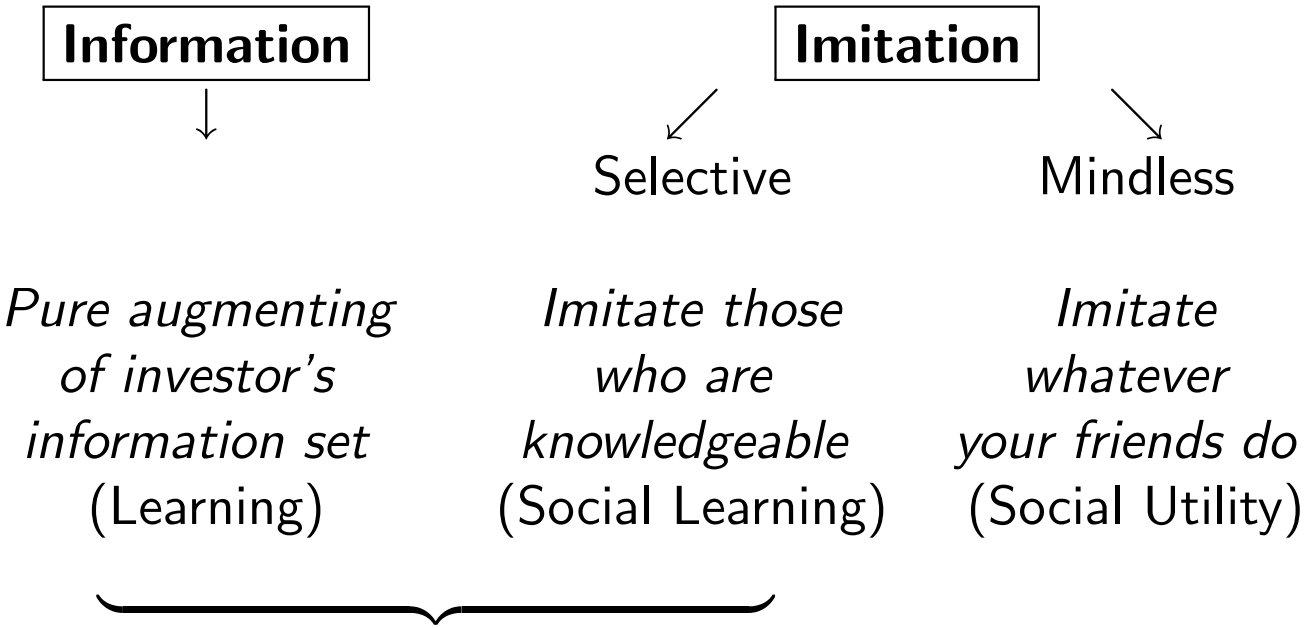
# Literature

Strands of literature:

1. Literature on social interactions/peer effects on asset and debt behavior of households, ex. Hong, Kubik and Stein (2004), Georgarakos, Haliassos and Pasini (2014).
2. Literature on the effects of social imitation and influence on financial behavior:
   - Banerjee, Chandrasekhar, Duflo and Jackson (2013): identify a pure information effect (new financial product, microfinance in India)
   - Bursztyn, Ederer, Ferman and Yuchtman (2014): identify both information and endorsement/social utility effects (experiment with new financial product amongst brokerage account holders in Brazil)
   - Burnside, Eichenbaum and Rebelo (2016) and Bailey, Cao, Kuchler and Stroebel (2016): model, calibrate and identify a social interactions effect on housing in the US, respectively.

*Our contribution*: complementary, but for a representative sample of the population of a developed country, and about a traditional financial opportunity (stock market).

# What do people get out of social interactions?



# Background for the model

- Within Hellwig (1980),
  - Static asset pricing model with a risky and a riskless asset, where asset prices transmit information
  - Large number of heterogeneous agents with individual private signals on risky asset payoff (stocks)
- Ozsoylev and Walden (2011) embed an information network,
  - Network connections are exogenous
  - Agents pool information by averaging signals from others they are connected to
  - Agents form expectations about the net excess return on the basis of pooled signals and prices
  - *No social utility motive* (conformity, etc.) within expected utility function
- We extend Ozsoylev and Walden (2011) to:
  - Heterogeneity in signal precision and risk preferences (Cabrales et al., 2013, 2017)
  - Agents pooled information is **weighted** by the precisions of connections' signals

# Model

## Main result

- Let the *connectedness* of investor $i$ be

$$(1) \quad k_i = \sum_{k=1}^{n} \frac{a_{ik}}{s_k^2}$$

- Let the average connectedness of the information network be

$$\lim_{n\to\infty} \frac{1}{n} \sum_{i=1}^{n} \frac{k_i}{\rho_i} = \beta + o(1), \ \beta < \infty$$

- Under reasonable/interpretable assumptions, as $n \longrightarrow \infty$, there exists a NREE price $p$ for the risky asset, which depends on a single network statistic: average network connectedness $\beta$

# Main Predictions of the Model

- In a large anonymous financial market, agents with more/better informed connections ($k_i^*$):

1. Form expectations of returns that give more weight to connections' signals ($i$'s pooled signal $x_i$),

$$\mathbb{E}\left(X|\mathcal{I}_i\right) = \frac{k_i^*\sigma^2\Delta^2}{k_i^*\sigma^2\Delta^2 + \Delta^2 + \sigma^2\beta^2}x_i + \left(\frac{\sigma^2\beta^2 + \Delta^2}{k_i^*\sigma^2\Delta^2 + \Delta^2 + \sigma^2\beta^2}\right)\bar{X}$$

2. Invest a higher proportion of their financial wealth in risky assets (i.e. trade more agressively),

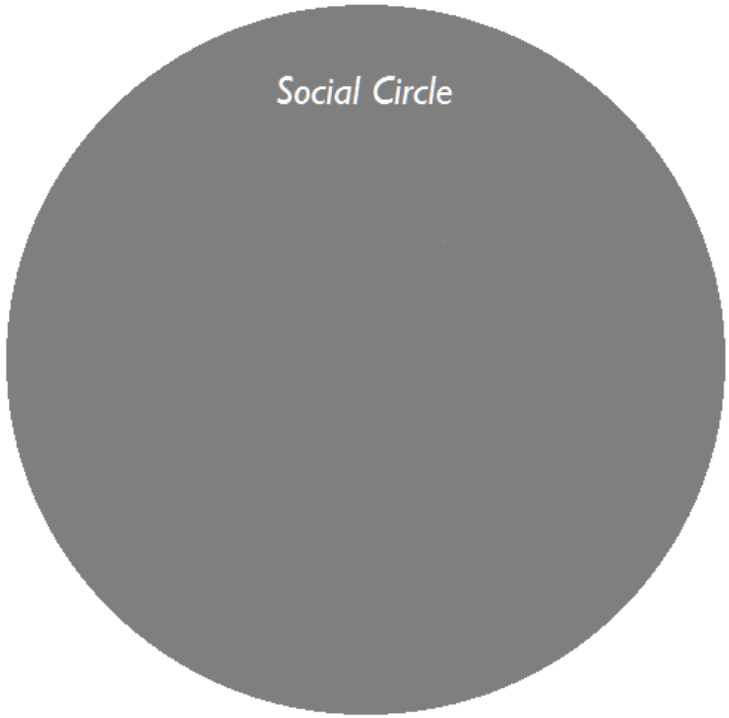
$$D_i^* \equiv \frac{1}{\rho_i}\left[\hat{\rho}\left(\frac{\bar{X}\Delta^2 + \bar{Z}\beta\sigma^2}{\hat{\rho}\sigma^2\Delta^2 + \sigma^2\beta}\right) - \hat{\rho}\left(\frac{\Delta^2}{\sigma^2\left(\hat{\rho}\Delta^2 + \beta\right)}\right)p + k_i^*\left(x_i - p\right)\right]$$

# Survey design

- Survey designed to look for information effect of social interactions on stock market participation (demand);
- Part of ongoing survey on a representative sample of the French population by age and asset classes (PAT€R);
- Two questionnaires (TNS2014 and follow-up TNS2015), sent to 4,000 households: Unit responses to TNS2014 = 3,670. Of those, unit responses to TNS2015 = 2,587 (70.5% response rate);
- Questions on:
  - Respondent's risk preferences, and socio-economic and demographic characteristics
  - Financial wealth (total and % invested in the stock market)
  - Perceptions and expectations about stock market returns (CAC-40) elicited probabilistically (Manski, 2004)
  - Detailed questionnaire for measures of individual connectedness, information and participation of peers

# Proxy for connectedness: Social circle

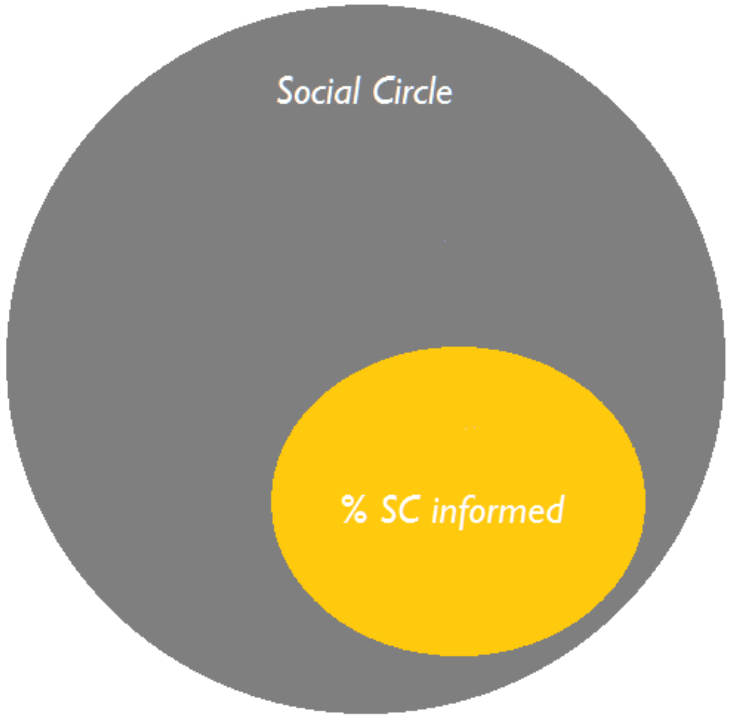
C1: '*Approximately how many people are there in your social circle of acquaintances?*'




(Average: 53 approx.)

# Proxy for connectedness: Social circle

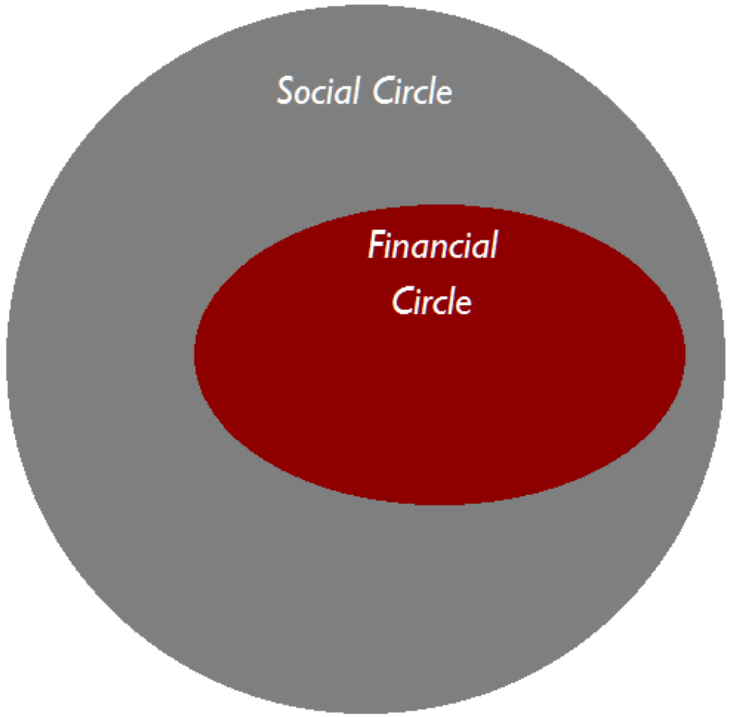
C7i: '*In your opinion, what is the proportion of people in your social circle that is informed about/follows the stock market?*'




(Average: 13% approx.)

# Proxy for connectedness: Financial circle

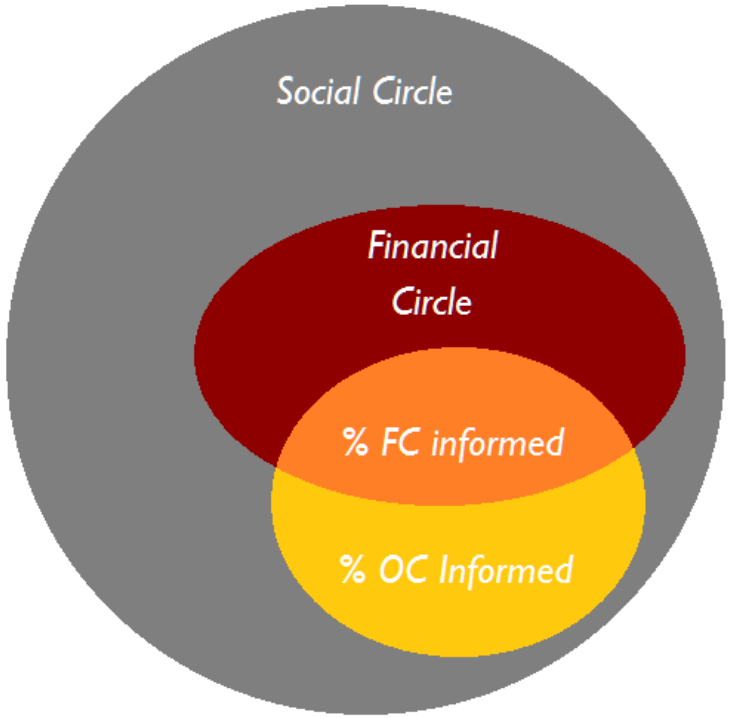
D1: '*With how many people from your social circle do you interact with regarding your financial/investment matters?*'




(Average: 3 approx.)

# Proxy for connectedness: **Info** from Financial circle

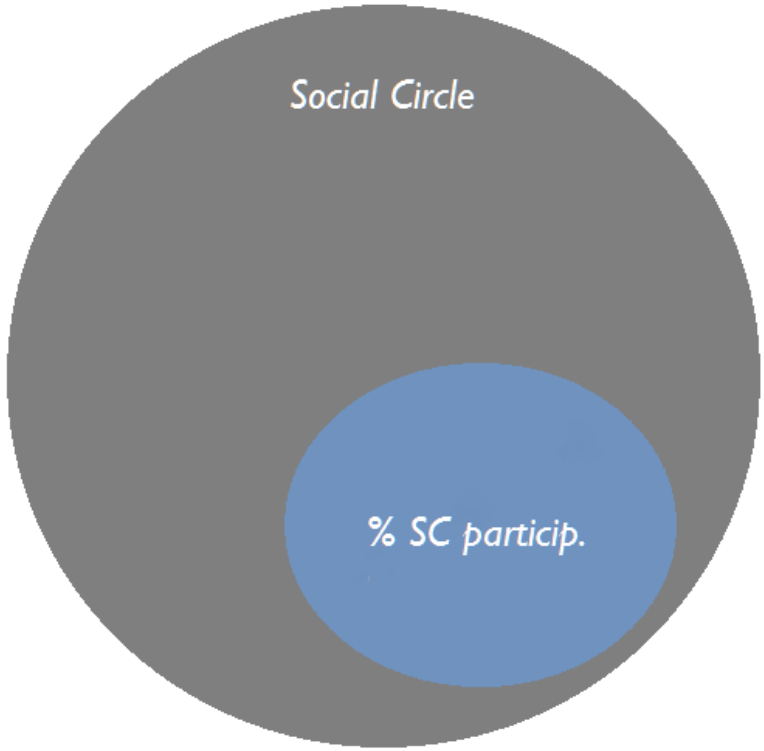
D16i: '*In your opinion, what is the proportion of people in your financial circle that follows the stock market?*'




(Average: 22% approx.)

# Selective imitation

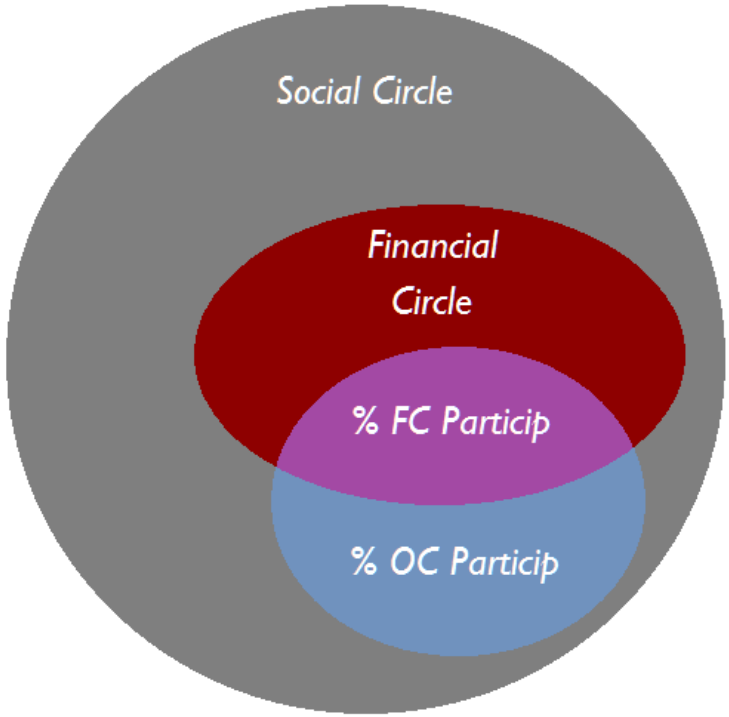
Repeat analysis but asking survey questions (C7ii) regarding the **participation** of acquaintances in the stock market...




(Average: 11% approx.)

# Selective imitation: Financial circle

... separating those with whom the respondent exchanges on financial matters (Fin. Circle, FC) from those with whom s/he does not (Outer Circle, OC):




(Average: 20% approx.)

# Do social interactions influence expectations of returns?

- OLS Econometric specification(s):

$$Expec.\ R_i = \kappa_0 + \underset{(+)}{\kappa_1}\, k_i^* \,(+\underset{(+)}{\kappa_1'}\, D_i^e) + \kappa \boldsymbol{\tau}_i + e_i$$

- Proxies for connectedness $k_i^*$: $\%SC\ Inform$, $k_{i,SC}^*$ the share of respondents' social circle (SC) informed about the stock market, which we then *split* into $\%FC\ Inform$, $k_{i,FC}^*$ and $\%OC\ Inform$, $k_{i,OC}^*$ :

$$Expec.\ R_i = \kappa_0 + \underset{(+)}{\kappa_{1,FC}}\, k_{i,FC}^* + \underset{(0)}{\kappa_{1,OC}}\, k_{i,OC}^* + \kappa \boldsymbol{\tau}_i + e_i$$

- (Proxies for selective and mindless'imitation' $D_i^e$ : $\%SC\ Particip$, $\%FC\ Particip$, $\%OC\ Particip$)
- Vector of individual characteristics, $\boldsymbol{\tau}_i$ : Age, gender, marital status, No. of children at home, education, region of residence, employment status, borrowing constraints, quartiles for wealth, income and (last 12-month) saving, and elicited risk *preferences* ($RA_i$) and *for relative standing* (profession, edu., wealth)

# Social interactions effect on Expectations: the Informed

| | Expec R | Expec R |
|---|---|---|
| % SC Inform. | 0.000307 | |
| | (0.000202) | |
| RA | -0.000708* | |
| | (0.000382) | |
| Controls | *Yes* | |
| $F$ ($p$-value) | 2.805 (0) | |
| Observations | 2,535 | 2,535 |

# Social interactions effect on Expectations: the Informed

| | Expec R | Expec R |
|---|---|---|
| % SC Inform. | 0.000307 | |
| | (0.000202) | |
| % FC Inform. | | 0.000239* |
| | | (0.000140) |
| % OC Inform. | | 4.18e-05 |
| | | (0.000268) |
| RA | -0.000708* | -0.000683* |
| | (0.000382) | (0.000385) |
| Controls | *Yes* | *Yes* |
| $F$ ($p$-value) | 2.805 (0) | 2.996 (0) |
| Observations | 2,535 | 2,535 |

# Social interactions effect on Expectations: (Selective) Imitation

| | Expec R | Expec R |
|---|---|---|
| % SC Particip. | 0.000407 | |
| | (0.000266) | |
| % FC Particip. | | 0.000225* |
| | | (0.000129) |
| % OC Particip. | | 0.000117 |
| | | (0.000360) |
| RA | -0.000702* | -0.000688* |
| | (0.000383) | (0.000385) |
| Controls | *Yes* | *Yes* |
| $F$ ($p$-value) | 2.809 (0) | 3.025 (0) |
| Observations | 2,535 | 2,535 |

# Directly informative social interactions

- Tobit (Probit) peer effects econometric specification(s):

$$D_i = \max\{0,\ \lambda_0 + \underset{(+/0)}{\lambda_1}\ k_i^*(+\ \underset{(0/+)}{\lambda_1'}\ D_i^e) + \underset{(+)}{\lambda_2}\, Expec.\ R_i + \lambda \boldsymbol{\tau}_i' + u_i\}$$

- Where $D_i \equiv \%FW_i$ denotes the share of respondent's financial wealth invested into stocks (Tobit), whilst $D_i \equiv \Pr(Stocks_i > 0)$ denotes the likelihood of individual $i$ being a stockholder (Probit)
- Proxies for $k_i^*$: $\%SC\ Inform$, $\%FC\ Inform$, $\%OC\ Inform$
- (Proxies for selective and mindless'imitation' $D_i^e$ : $\%SC\ Particip$, $\%FC\ Particip$, $\%OC\ Particip$)
- Elicited probabilistic expectations of (cumulative 5-year-ahead stock market) returns, $Expec.\ R_i$
- Vector of individual characteristics, $\boldsymbol{\tau}_i'$ : Age, gender, marital status, No. of children at home, education, region of residence, employment status, borrowing constraints, quartiles for wealth, income and (last 12-month) saving, and elicited risk *preferences* ($RA_i$) and *for relative standing* (profession, edu., wealth)

# Pure information: Stockholding

| | Pr(Stock)>0 | % FW | Pr(Stock)>0 | %FW |
|---|---|---|---|---|
| % SC Inform. | 0.00295*** | 0.0722** | | |
| | (0.000927) | (0.0299) | | |
| % FC Inform. | | | | |
| | | | | |
| % OC Inform. | | | | |
| | | | | |
| Expec R | 0.222** | 10.22*** | | |
| | (0.321) | (3.445) | | |
| RA | -0.00394** | -0.112** | | |
| | (0.00216) | (0.0571) | | |
| Controls | *Yes* | *Yes* | | |
| Log-likelihood | -1223 | -3635 | | |
| LR $\chi^2$ (p-value) | 396.1 (0) | 373.1 (0) | | |
| Observations | 2,525 | 2,294 | 2,525 | 2,294 |

# Pure information: Stockholding

| | Pr(Stock)>0 | % FW | Pr(Stock)>0 | %FW |
|---|---|---|---|---|
| % SC Inform. | 0.00295*** | 0.0722** | | |
| | (0.000927) | (0.0299) | | |
| % FC Inform. | | | 0.00263*** | 0.0293 |
| | | | (0.000660) | (0.0216) |
| % OC Inform. | | | 0.000111 | 0.0291 |
| | | | (0.00126) | (0.0408) |
| Expec R | 0.222** | 10.22*** | 0.204** | 10.55*** |
| | (0.321) | (3.445) | (0.0953) | (3.67) |
| RA | -0.00394** | -0.112** | -0.00409** | -0.120** |
| | (0.00216) | (0.0571) | (0.00185) | (0.0606) |
| Controls | *Yes* | *Yes* | *Yes* | *Yes* |
| Log-likelihood | -1223 | -3635 | -1202 | -3634 |
| LR $\chi^2$ (p-value) | 396.1 (0) | 373.1 (0) | 435.0 (0) | 375.9 (0) |
| Observations | 2,525 | 2,294 | 2,525 | 2,294 |

# Selective Imitation: Stockholding

| | Pr(Stock)>0 | % FW | Pr(Stock)>0 | %FW |
|---|---|---|---|---|
| % SC Particip. | 0.00504*** | 0.0766** | | |
| | (0.000881) | (0.0303) | | |
| % FC Particip. | | | 0.00210*** | 0.0308 |
| | | | (0.00066) | (0.0599) |
| % OC Particip. | | | 0.00240* | 0.0657 |
| | | | (0.00125) | (0.0431) |
| Expec R | 0.209** | 10.71*** | 0.199** | 11.14*** |
| | (0.0953) | (3.603) | (0.0934) | (3.909) |
| RA | -0.0039** | -0.118** | -0.00407** | -0.124* |
| | (0.00192) | (0.0591) | (0.00180) | (0.0642) |
| Controls | *Yes* | *Yes* | *Yes* | *Yes* |
| Log-likelihood | -1205 | -3636 | -1204 | -3634 |
| LR $\chi^2$ (p-value) | 419.0 (0) | 375.7 (0) | 420.1 (0) | 375.7 (0) |
| Observations | 2,525 | 2,294 | 2,525 | 2,294 |

# Mechanism: social interactions effect on own information?

- We have evidence of informed peer effects on own subjective expectations of returns and own stockholding:
  a higher proportion of informed/participating peers increases expected returns and thereby, stockholding at both margins...
- Does talking to optimists makes you more optimistic?
  No: Talking to informed peers makes you better informed about *facts*
- Relevant fact $\approx$ the (most recently) realised (3-year) cumulative stock return $R_t(3)$, which was 34.57%
- We probabilistically elicit respondents' perception about $R_t(3)$, and compute the mean response for each individual, $R_t^i$ denoted '*Perc*. $R_i$'.
  Cross-sectional sample mean is 3.6%, i.e. the average respondent has a **perception gap** which *underestimates the truth* by around *ten times*.
- We therefore examine whether a larger share of informed peers reduces the 'perception gap', as follows:

$$\textit{Perc. } R_i = \eta_0 + \underset{(+)}{\eta_{1,FC}\, k_i^*} + \underset{(0)}{\eta_{1,OC}\, k_{i,OC}^*} + \mathbf{v}_i\boldsymbol{\eta} + \varrho_i$$

# Mechanism: Perceptions

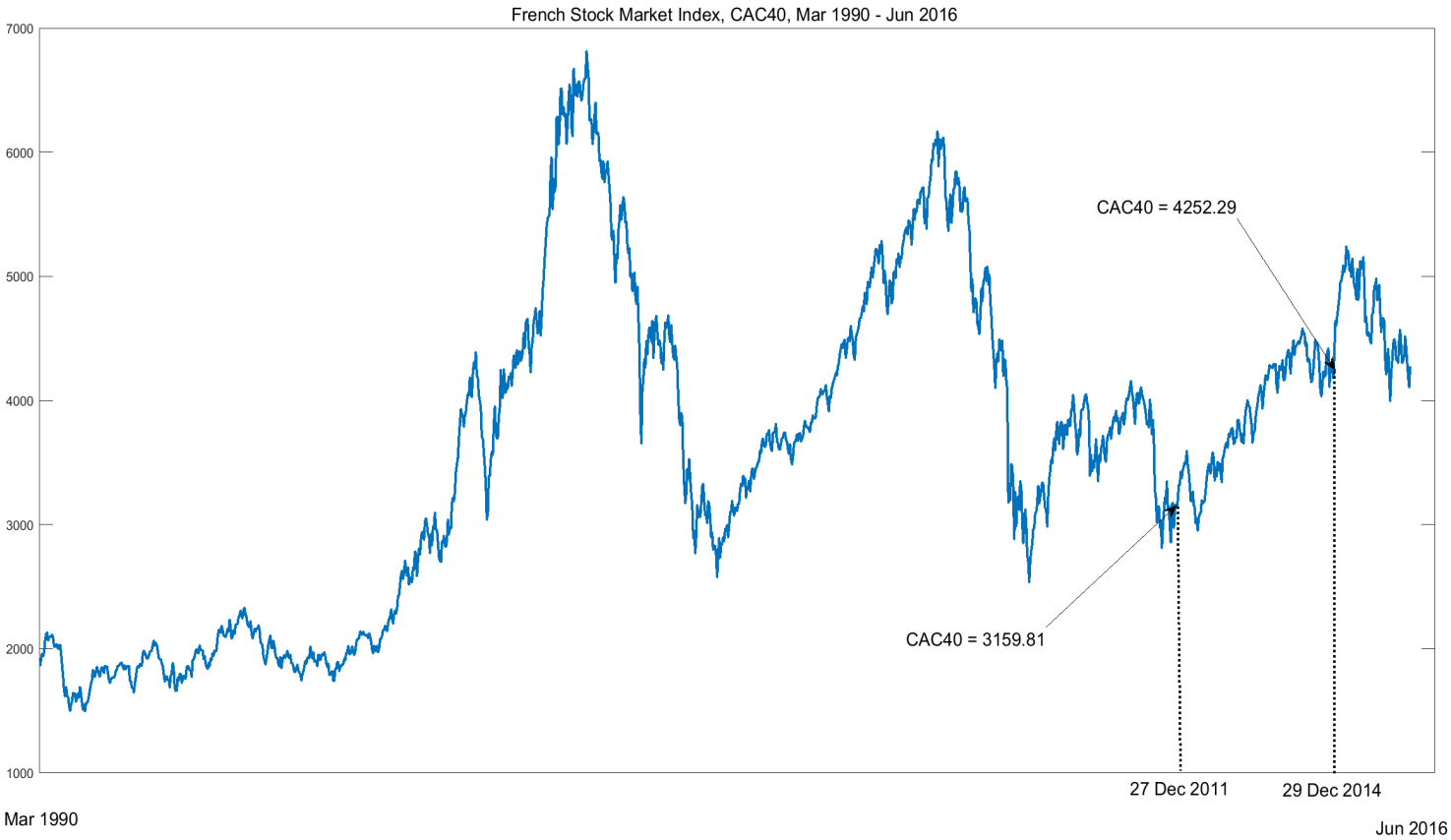



Figure: French stock market index, CAC 40, weekly data, 3 March 1990 - 27 June 2016. Source: Yahoo Finance.

# Mechanism: Social interactions effect on own information

| | Perc. R. | Perc. R. | Expec. R. | Expec. R. | Expec. R. |
|---|---|---|---|---|---|
| % FC Inform. | 0.000678*** | | | 5.88e-05 | |
| | (0.000221) | | | (0.000135) | |
| % OC Inform. | -4.55e-06 | | | 3.86e-05 | |
| | (0.000371) | | | (0.000242) | |
| % FC Particip. | | 0.000544*** | | | 7.93e-05 |
| | | (0.000211) | | | (0.000124) |
| % OC Particip. | | 0.000636 | | | -1.64e-05 |
| | | (0.000462) | | | (0.000340) |
| Perc. R. | | | 0.286*** | 0.285*** | 0.284*** |
| | | | (0.0266) | (0.0267) | (0.0266) |
| Risk Aversion | -0.00136** | -0.00139** | -0.000358 | -0.000337 | -0.000336 |
| | (0.000580) | (0.000577) | (0.000339) | (0.000341) | (0.000341) |
| Controls | | | *Yes* | | |
| $F\ (p-value)$ | 5.059 (0) | 5.121 (0) | 6.226 (0) | 5.610 (0) | 5.543 (0) |
| Observations | 2255 | 2255 | 2535 | 2535 | 2535 |

# Findings

- Socially interacting with informed peers raises own subjective stock market return expectations, albeit mildly
- ...by levelling up respondents' (scant) information with publicly available data
- Expectations have a substantial effect on stockholdings (e.g. Dominitz and Manski, 2007)
- Conditioning on expectations, informed peer information and stockholdings influence own stockholdings
- Evidence supports an overall positive effect of **informative social interactions**
- There are smaller albeit significant effects of share of **outer circle** participating on stockholdings, without respondents' information being more in line with publicly available data $\Longrightarrow$ some evidence of mindless imitation (more below)

# Policy implications

- Socially interacting with informed peers raises own subjective stock market return expectations, albeit mildly ...by levelling up respondents' (scant) information with publicly available data
  - $\Longrightarrow$Public information provision of relevant facts: returns on alternative investments, interest rates, inflation, etc. but also on professional forecasters' forecasts?
- Expectations have a substantial effect on stockholdings (e.g. Dominitz and Manski, 2007)
  - $\Longrightarrow$Systematic collection of expectations data: INSEE, Caisse de Depots, etc.
- Evidence supports an overall positive effect of **informative social interactions**
  - $\Longrightarrow$'Investment clubs' need not just be 'echo-chambers', may actually contribute towards the spread of factual information relevant for sound financial decision taking (or, they could be 'capped')

# Unobserved heterogeneity

1. We split individual social circles into the 'financial circle' and the 'outer circle': we find statistical evidence in support of the former and (almost) no statistical evidence in support of the latter, which controls for unobserved individual heterogeneity ('**double ring**' methodology, Grinblatt *et al.*, 2008)
2. We include very **detailed individual covariates**, *including* questions about how do respondents view themselves relative to the members of the social and financial circles to control for social utility motives, and find no evidence in support of the latter
3. We conduct counterfactual **placebo tests**, by randomizing individual responses to questions on financial circle information and participation: artificial 'in-sample' bins constructed on age, education and region of residence provide no evidence in support of an unobserved group effect
4. Results robust to **selection of peers/acquaintances** with whom to interact on respondents' financial matters, which supports the identification of an information (contextual) peer effect on individual stockholdings (Blume *et al.* 2011, 2015)

# Summary and going forward

- Theory suggests that social interactions improves investors information about the stock market
- i.e. investors are more likely to trade and trade more the higher the number/quality of 'informed connections'
- We find evidence in favour of this, and delink informative and uninformative social interactions
- The ones that (mostly) matter for stock market decisions are informative social interactions
- Main result: strong evidence of a **pure information channel** in a *developed country mature financial market*
- No (strong) evidence of mindless imitation in stock market decisions

# Appendix: Separating social from financial circle

C1: *Approximately how many people are there in your social circle of acquaintances?*

D1: *With how many people from your social circle (as identified in C1) do you interact with regarding your financial/investment matters?*

C7i/D16i: *In your opinion, what is the proportion of people in your social/financial circle that invests in the stock market? (as a %)*

C7ii/D16ii: *In your opinion, what is the proportion of people in your social/financial circle that is informed about the stock market? (as a %)*

# Appendix: Separating social from financial circle

| Variable | Mean all | Mean inv | Questions |
|---|---|---|---|
| SC | 53 | 53.6 | C1 |
| FC | 3 | 3 | D1 |
| OC | – | – | C1-D1 |
| %SC Inform. | 12.5% | 15.8% | C7ii |
| %SC Particip. | 10.6% | 15.3% | C7i |
| %FC Inform. | 20.1% | 28.2% | D16ii |
| %FC Particip. | 22% | 27.7% | D16i |
| %OC Inform. | – | – | $\frac{C1 \times C7ii - D1 \times D16ii}{C1 - D1}$ |
| %OC Particip. | – | – | $\frac{C1 \times C7i - D1 \times D16i}{C1 - D1}$ |
| %FW | 5.32% | 21.4% | C19 |
| Pr(Stock>0) | – | – | C19 |
| Perc. R | 3.6% | 5.1% | C42 |
| Expec. R | 1.6% | 2.3% | C39 |
| Actual R | $> 30\%$ | – | *Yahoo Finance* |

# Appendix: Mean/Median Responses to Expec.R. and Perc.R. Questions

| VARIABLES | # obs. | Mean | Median | St. D. | Min | Max |
|---|---|---|---|---|---|---|
| Expec. R | 2535 | 0.0162 | 0.0000 | 0.0894 | -0.6250 | 0.625 |
| SD Expec. R | 2535 | 0.0669 | 0.0500 | 0.0708 | 0 | 0.3875 |
| Perc. R | 2328 | 0.0360 | 0.0050 | 0.1204 | -0.3750 | 0.3750 |
| SD Perc. R | 2328 | 0.0664 | 0.0433 | 0.0717 | 0 | 0.3114 |

Table: Questions C39 and C42, TNS 2014. Summary Statistics.

# Appendix: Histograms of Mean and St.Dev. of Expec.R.

## Histograms of Mean and St.Dev. of Subjective Expectations of Returns; question C39 TNS2014

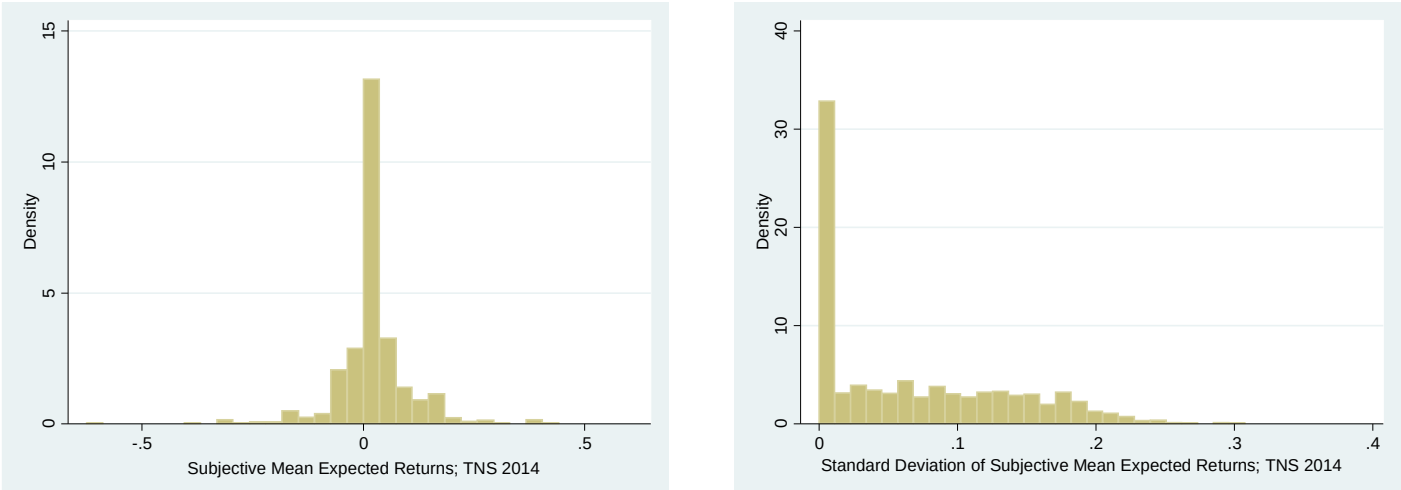



Figure 1a: Histograms of the subjective mean (left panel) expected five-year ahead cumulative return, and its standard deviation (right panel); TNS2014.

# Appendix: Histograms of Mean and St.Dev. of Perc.R.

## Histograms of Mean and St.Dev. of Subjective Perceptions of Returns; question C42 TNS2014

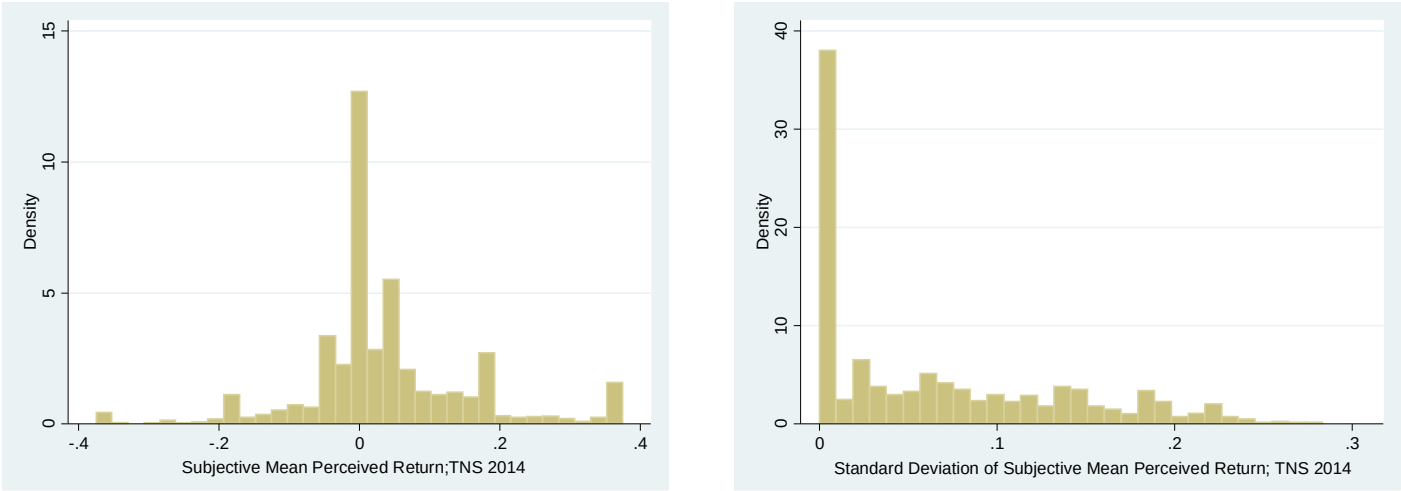



Figure 1b: Histograms of the subjective mean (left panel) perceived three-year cumulative realized return, and its standard deviation (right panel); TNS2014.

# Appendix: Robustness of Pure Information...

...to alternative treatments of inconsistent answers (IC)

| | Most Conservative | Conservative | | Least Conservative | |
|---|---|---|---|---|---|
| | %FW | % FW | %FW | % FW | %FW |
| % SC Inform. | | 0.0722** | | 0.0761** | |
| | | (0.0299) | | (0.0297) | |
| % FC Inform. | 0.0293 | | 0.0361* | | 0.0381* |
| | (0.0216) | | (0.0202) | | (0.0204) |
| % OC Inform. | 0.0291 | | 0.0235 | | 0.0212 |
| | (0.0408) | | (0.0403) | | (0.0386) |
| Expec R | 10.55*** | 10.22*** | 10.46*** | 10.46*** | 10.78*** |
| | (3.67) | (3.445) | (3.667) | (3.522) | (3.770) |
| RA | -0.120** | -0.112** | -0.117** | -0.121** | -0.124** |
| | (0.0606) | (0.0571) | (0.0586) | (0.0609) | (0.0641) |
| Controls | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Log-likelihood | -3634 | -3635 | -3633 | -3635 | -3633 |
| LR $\chi^2$ (p-value) | 375.9 (0) | 373.1 (0) | 377.3 (0) | 373.8 (0) | 377.3 (0) |
| Observations | 2,294 | 2,294 | 2,294 | 2,294 | 2,294 |

# Appendix: Robustness of Selective Imitation...

...to alternative treatments of Inconsistent answers (IC)

| | Most Conservative | Conservative | | Least Conservative | |
|---|---|---|---|---|---|
| | %FW | % FW | %FW | % FW | %FW |
| % SC Particip. | | 0.0766** | | 0.0878*** | |
| | | (0.0306) | | (0.0306) | |
| % FC Particip. | 0.0308 | | 0.0507** | | 0.0506** |
| | (0.0599) | | (0.0220) | | (0.0219) |
| % OC Particip. | 0.0657 | | 0.0484 | | 0.043 |
| | (0.0431) | | (0.0424) | | (0.0423) |
| Expec R | 11.14*** | 10.71*** | 11.04*** | 10.63*** | 11.02*** |
| | (3.909) | (3.603) | (3.900) | (3.608) | (3.887) |
| RA | -0.124* | -0.118** | -0.117** | -0.121** | -0.124** |
| | (0.0642) | (0.0591) | (0.0586) | (0.0609) | (0.0641) |
| Controls | *Yes* | *Yes* | *Yes* | *Yes* | *Yes* |
| Log-likelihood | -3634 | -3636 | -3632 | -3635 | -3632 |
| LR $\chi^2$ (p-value) | 375.7 (0) | 372.1 (0) | 379.3 (0) | 374.1 (0) | 379.3 (0) |
| Observations | 2,294 | 2,294 | 2,294 | 2,294 | 2,294 |

# Appendix: Placebo tests on Stockholding

| | Pr(stocks $>$ 0) | | | |
|---|---|---|---|---|
| % FC Inform. | 0.00263*** | | -0.00105 | |
| | (0.000600) | | (0.000781) | |
| % OC Inform. | 0.000111 | | 0.000966 | |
| | (0.00126) | | (0.00136) | |
| % FC Particip. | | 0.00210*** | | 0.000115 |
| | | (0.000660) | | (0.000756) |
| % OC Particip. | | 0.00240* | | -0.00187 |
| | | (0.00125) | | (0.00141) |
| Expec. R. | 0.204** | 0.199** | 0.195** | 0.194** |
| | (0.0953) | (0.0934) | (0.100) | (0.100) |
| Controls | | *Yes* | | |
| Log-likelihood | -1202 | -1204 | -1215 | -1214 |
| LR $\chi^2$ (p-value) | 435.0 (0) | 420.1 (0) | 398.6 (0) | 396.2 (0) |
| Pseudo $R^2$ | 0.168 | 0.168 | 0.161 | 0.165 |
| Observations | 2,525 | 2,525 | 2,512 | 2,512 |

# Appendix: Placebo tests on %FW (Least conservative IC)

| E(% Fin.Wealth in Stocks\|Stocks > 0) | | | | |
|---|---|---|---|---|
| % FC Inform. | 0.0381* | | 0.0102 | |
| | (0.0204) | | (0.0207) | |
| % OC Inform. | 0.0212 | | 0.0275 | |
| | (0.0386) | | (0.0361) | |
| % FC Particip. | | 0.0506** | | 0.0229 |
| | | (0.0219) | | (0.0223) |
| % OC Particip. | | 0.043 | | 0.0704 |
| | | (0.0423) | | (0.0413) |
| Expec. R. | 10.78*** | 11.02*** | 9.919*** | 10.25*** |
| | (3.770) | (3.887) | (3.216) | (3.278) |
| Controls | | *Yes* | | |
| Log-likelihood | -3633 | -3632 | -3534 | -3533 |
| LR $\chi^2$ (p-value) | 377.3 (0) | 379.3 (0) | 358.1 (0) | 359.8 (0) |
| Pseudo $R^2$ | 0.0494 | 0.0496 | 0.0482 | 0.0485 |
| Observations | 2,294 | 2,294 | 2,197 | 2,124 |

# Appendix: Selection of FC (I)

- Main concern: respondents who intend to invest in the stock market, choose within their social circles the peers with whom to discuss their own financial matters (FC).
- Therefore, we treat group choice and behaviour within a group as a set of (potentially correlated) joint outcomes (Blume et al., 2011, 2015), as follows
  - We separately model the choice of a financial circle, $\Pr(FC_i > 0)$, within the respondents' social circle on the basis of expected average peer stock market information, $\%SCInform.$, and participation, $\%SCParticip.$, that may occur, and the individual choice to hold stocks

$$\begin{cases} \Pr(FC_i > 0) = \Phi(\nu_1' k_{iSC}^* + \nu_2' Expec\ R_i + \nu_3' RA_i + \boldsymbol{\tau}_i \boldsymbol{\nu}') \\ \Pr(Stocks_i > 0) = \Phi(\lambda_0 + \lambda_1 k_{iFC}^* + \lambda_2 k_{iOC}^* + \lambda_3 Expec\ R_i + \boldsymbol{\tau}_i \boldsymbol{\lambda}) \end{cases}$$

  - *If* $u_i$ and $\nu_{iFC}$ are correlated, $u_i = \rho \nu_{iFC} + v_i$, *then* we should reject $H_o$: $\rho = 0$

| | $Pr(Stocks_i>0)$ | $Pr(FC_i>0)$ | $Pr(Stocks_i>0)$ | $Pr(FC_i>0)$ |
|---|---|---|---|---|
| % FC Inform. | 0.00255*** | | | |
| | (0.000616) | | | |
| % OC Inform. | 0.000174 | | | |
| | (0.00126) | | | |
| % SC Inform. | | 0.00292** | | 0.00291** |
| | | (0.00137) | | (0.00136) |
| % FC Partic. | | | 0.00214*** | |
| | | | (0.000675) | |
| % OC Partic. | | | 0.00230* | |
| | | | (0.00126) | |
| % SC Partic. | | -0.000461 | | -0.000470 |
| | | (0.00144) | | (0.00143) |
| Controls | | Yes | | |
| Log-likelihood | -1817 | -1817 | -1817 | -1817 |
| LR $\chi^2$ (p-value) | 596.3 (0) | 596.3 (0) | 589.5 (0) | 589.5 (0) |
| rho | 0.0115 | 0.0115 | 0.0247 | 0.0247 |
| Wald $\chi^2(1)$ $H_o$:rho=0 | 0.0504 | 0.0504 | 0.240 | 0.240 |
| p-value $\chi^2(1)$ | 0.822 | 0.822 | 0.624 | 0.624 |
| Observations | 1684 | 1684 | 1684 | 1684 |

# Appendix: Selection of FC (II)

- We model the choice of a financial circle, $g = FC$, based on an overall respondent specific quality measure for each group, i.e.

$$Q_{ig} = \nu_1 k^*_{ig} + \boldsymbol{\tau}_i \nu + \nu_{ig}.$$

- If $g = \{FC, OC\}$, $i$ chooses $\underset{g}{max} Q_{ig}$ on the basis of only the expected average peer stock market information (or participation) that may occur, $k^*_{ig} = \{\%\ g\ Inform., (\%\ g\ Particip.)\}$, then $\Pr(FC_i > 0) = \Pr(Q_{iFC} - Q_{iOC} \geq 0)$:

$$\begin{cases} \Pr(FC_i > 0) = \Phi(\nu'_1[k^*_{iFC} - k^*_{iOC}] + \nu'_2 Expec\ R_i + \nu'_3 RA_i + \boldsymbol{\tau}_i \boldsymbol{\nu}') \\ \Pr(Stocks_i > 0) = \Phi(\lambda_0 + \lambda_1 k^*_{iFC} + \lambda_2 Expec\ R_i + \lambda_3 RA_i + \boldsymbol{\tau}_i \boldsymbol{\lambda}) \end{cases}$$

- Again, IF $u_i$ and $\nu_{iFC} - \nu_{iOC}$ correlated, $u_i = \rho(\nu_{iFC} - \nu_{iOC}) + v_i$, THEN we should reject $H_o$: rho=0.

| | Pr(Stocks$_i$>0) | Pr(FC$_i$>0) | Pr(Stocks$_i$>0) | Pr(FC$_i$>0) |
|---|---|---|---|---|
| % FC Inform. | 0.00814*** | 0.0153*** | 0.00814*** | 0.0101*** |
| | (0.00179) | (0.00243) | (0.00179) | (0.00370) |
| % OC Inform. | 0.00147 | -0.00397 | 0.00147 | -0.00179 |
| | (0.00316) | (0.00359) | (0.00316) | (0.00482) |
| % FC Partic. | | | | 0.00940** |
| | | | | (0.00423) |
| % OC Partic. | | | | -0.00642 |
| | | | | (0.00550) |
| Expec. R. | 0.770* | 0.0748 | 0.770* | 0.0549 |
| | (0.399) | (0.391) | (0.399) | (0.393) |
| Controls | | Yes | | |
| Log-likelihood | -1709 | -1709 | -1702 | -1702 |
| LR $\chi^2$ (p-value) | 723.9 (0) | 723.9 (0) | 714.0 (0) | 714.0 (0) |
| rho | 0.0159 | 0.0159 | 0.0154 | 0.0154 |
| Wald $\chi^2(1)$ $H_o$:rho=0 | 0.105 | 0.105 | 0.0971 | 0.0971 |
| p-value $\chi^2(1)$ | 0.746 | 0.746 | 0.755 | 0.755 |
| Observations | 1684 | 1684 | 1684 | 1684 |

# Appendix: Is it what peers do or how informed they are?

## Effect on Stockholdings

| VARIABLES | (1) Pr(%FW>0) | (2) Pr(%FW>0) | (3) Pr(%FW>0) |
|---|---|---|---|
| % FC Particip. | 0.00646*** | | 0.00573* |
| | (0.00194) | | (0.00316) |
| % FC Inform. | | 0.00535*** | 0.000810 |
| | | (0.00179) | (0.00298) |
| % OC Particip. | 0.00298 | | 0.00276 |
| | (0.00327) | | (0.00441) |
| % OC Inform. | | 0.00225 | 0.000239 |
| | | (0.00317) | (0.00442) |
| Perc. R | 0.851*** | 0.863*** | 0.847*** |
| | (0.251) | (0.250) | (0.250) |
| Controls | Yes | Yes | Yes |
| LR $\chi^2$ (p-value) | 428.03(0) | 432.81(0) | 434.45(0) |
| Pseudo $R^2$ | 0.1516 | 0.1513 | 0.1528 |
| Observations | 3,670 | 3,670 | 3,670 |

# Appendix: Additional Evidence of Pure Information

1. Perceptions of returns (proxy for how informed respondents are) are more in line with available data the more/better 'connected' individuals are: higher number of informed peers in FC associated with perceived return closer to the true return (i.e. better informed individual);
2. We decompose the effect of social interactions on stockholdings by the 'net balance in the flow of information' given to and received from those with whom the respondent exchanges on her/his own financial matters (% *FC Inform.*), to find that most of the effect comes from 'balanced' and 'net receiver' information exchanges at both margins;

| Pr(Holding stocks dir. or indir. $> 0$) | | |
|---|---|---|
| % FC Inform. | 0.00844*** | |
| | (0.00177) | |
| (% FC Inform.)*(Inform to = Informed from) | | 0.00941*** |
| | | (0.00245) |
| (% FC Inform.)*(Inform to $>$ Informed from) | | 0.00682*** |
| | | (0.00240) |
| (% FC Inform.)*(Inform to $<$ Informed from) | | 0.00808** |
| | | (0.00332) |
| % OC Inform. | 0.00126 | 0.00228 |
| | (0.00317) | (0.00312) |
| No FC | | -0.0252 |
| | | (0.0844) |
| Controls | *Yes* | |
| Log-likelihood | -1203 | -1200 |
| LR $\chi^2$ (p-value) | 422.7 | 448.3 |
| Pseudo $R^2$ | 0.168 | 0.170 |
| Observations | 2,525 | 2,525 |

| Pr(Holding stocks dir. or indir. $> 0$) | | |
|---|---|---|
| % FC Particip. | 0.00783*** | |
| | (0.00195) | |
| (% FC Particip.)*(Inform to = Informed from) | | 0.0113*** |
| | | (0.00276) |
| (% FC Particip.)*(Inform to $>$ Informed from) | | 0.00542** |
| | | (0.00253) |
| (% FC Particip.)*(Inform to $<$ Informed from) | | 0.00770** |
| | | (0.00355) |
| % OC Particip. | 0.00684** | 0.00780** |
| | (0.00333) | (0.00340) |
| No FC | | -0.0534 |
| | | (0.0835) |
| Controls | | |
| Log-likelihood | -1202 | -1201 |
| LR $\chi^2$ (p-value) | 435.4 | 441.9 |
| Pseudo $R^2$ | 0.168 | 0.169 |
| Observations | 2,525 | 2,525 |

| E(% Fin.Wealth in Stocks\|Hold. Stocks $> 0$) | | |
|---|---|---|
| % FC Particip. | 0.150** | |
| | (0.0599) | |
| (% FC Particip.)*(Inform to = Informed from) | | 0.139* |
| | | (0.0811) |
| (% FC Particip.)*(Inform to $>$ Informed from) | | 0.109 |
| | | (0.0804) |
| (% FC Particip.)*(Inform to $<$ Informed from) | | 0.0739 |
| | | (0.107) |
| % OC Particip. | 0.147 | 0.171 |
| | (0.105) | (0.106) |
| No FC | | 0.249 |
| | | (2.697) |
| Controls | *Yes* | |
| Log-likelihood | -3634 | -3634 |
| LR $\chi^2$ (p-value) | 376.3 | 375.7 |
| Pseudo $R^2$ | 0.0492 | 0.0491 |
| Observations | 2,294 | 2,294 |

| E(% Fin.Wealth in Stocks\|Hold. Stocks $> 0$) | | |
|---|---|---|
| % FC Inform. | 0.142** | |
| | (0.0575) | |
| (% FC Inform.)*(Inform to $=$ Informed from) | | 0.115 |
| | | (0.0750) |
| (% FC Inform.)*(Inform to $>$ Informed from) | | 0.134* |
| | | (0.0785) |
| (% FC Inform.)*(Inform to $<$ Informed from) | | 0.124 |
| | | (0.105) |
| % OC Inform. | 0.00784 | 0.0214 |
| | (0.100) | (0.0999) |
| No FC | | 0.659 |
| | | (2.732) |
| Controls | *Yes* | |
| Log-likelihood | -3632 | -3633 |
| LR $\chi^2$ (p-value) | 379.5 | 378.0 |
| Pseudo $R^2$ | 0.0497 | 0.0495 |
| Observations | 2,294 | 2,294 |

# MODEL (I)

- Large discrete number of agents $n$
- Two assets, one risky (stock) and one riskless (bond)
- The payoff of the riskless asset is 1
- The payoff of the risky asset follows a normal distribution $X \sim N(\bar{X}, \sigma^2)$ and its price is $p$
- Supply of stocks is random and is given by $Z_n = nZ$, where $Z \sim N(\bar{Z}, \Delta^2)$ and $\bar{Z} > 0$
- Agents have CARA preferences over final wealth $\omega_i$ and solve

$$\max_{D_i} \mathbb{E}\left[-e^{-\rho_i \omega_i} \middle| \mathcal{I}_i\right]$$

$$s.t. \quad \omega_i = \omega_{0i} + D_i (X - p)$$

- To find the optimal demand $D_i^*$ that maximizes expected utility, given their information set $\mathcal{I}_i$

$$D_i^* = \frac{1}{\rho_i} \frac{\mathbb{E}\left[(X - p) | \mathcal{I}_i\right]}{Var\left[X | \mathcal{I}_i\right]}$$

# MODEL (II)

## Investors' information

- What is contained in $\mathcal{I}_i$?
- Price $p$ and signals
- Each agent observes an individual, private signal about the return on the risky asset $y_i = X + \epsilon_i$, $\epsilon_i \sim N(0, s_i^2)$
- Two networks:
  1. Acquaintances: adjacency matrix $A$, with $a_{ij} \in \{0, 1\}$
  2. Information network: adjacency matrix $G$, with $g_{ij} = a_{ij}/s_j^2$, where $s_j^{-2}$ is signal precision of agent $j$
- The pooled payoff signal is

$$x_i = \frac{\sum_{k=1}^{n} g_{ik} y_k}{\sum_{k=1}^{n} g_{ik}} = X + \frac{\sum_{k=1}^{n} g_{ik} \epsilon_k}{\sum_{k=1}^{n} g_{ik}}$$

- Because $n$ is large, no incentives to hide information (private signals) from one's friends