Informative Social Interactions

L. Arrondel, H. Calvo-Pardo, C. Giannitsarou and M. Haliassos

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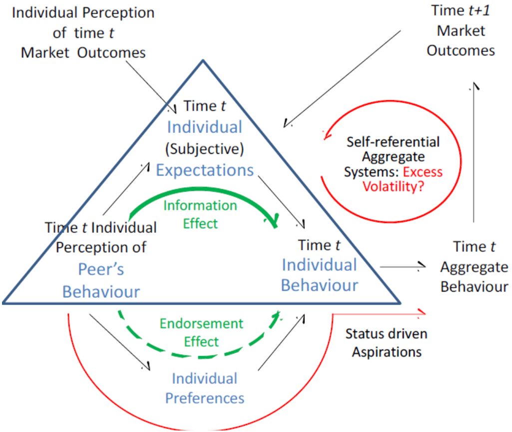
Question and Motivation

- *Do social interactions matter for financial behaviour?* i.e.
  - Is it what others' **know** or what others' **do**?
  - 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?

Information

$\downarrow$

Pure augmenting of investor's information set
(Learning)

What do people get out of social interactions?

$\boxed{\textbf{Information}}$

$\downarrow$

Pure augmenting of investor's information set
(Learning)

$\boxed{\textbf{Imitation}}$

$\searrow$

Mindless

Imitate whatever your friends do
(Conformity, etc.)

What do people get out of social interactions?

Information	**Imitation**	
↓	↙ Selective	↘ Mindless
Pure augmenting of investor's information set (Learning)	*Imitate those who are knowledgeable* (Social Learning)	*Imitate whatever your friends do* (Conformity, etc.)

What do people get out of social interactions?

Information	**Imitation**	
$\downarrow$	$\swarrow$ Selective	$\searrow$ Mindless
Pure augmenting of investor's information set (Learning)	*Imitate those who are knowledgeable* (Social Learning)	*Imitate whatever your friends do* (Conformity, etc.)

$\underbrace{\text{Learning} \quad \text{Social Learning}}_{\textbf{Informative social interactions}}$

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 EU(.);
- We extend Ozsoylev and Walden (2011) to:
  - Heterogeneity in signal precision and risk preferences;
  - Agents 'pooled information' is **weighted** by the precisions of connections' signals;

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 ω_i and solve

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

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

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

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

- 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

MODEL (III)

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 $n \to \infty$, there exists a NREE price p for the risky asset, which depends on average network connectedness β

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 agresively),

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

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;

Separating social from financial circle

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

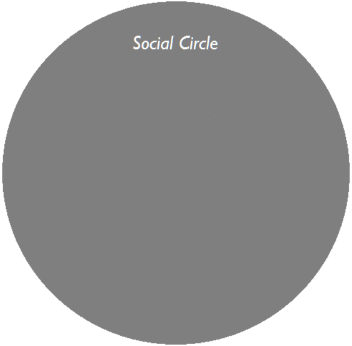
D1: *With how many people from your social circle (as identified in C1) do you interact with regarding your financial/investment matters?*

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 %)*

Proxy for connectedness: Social circle

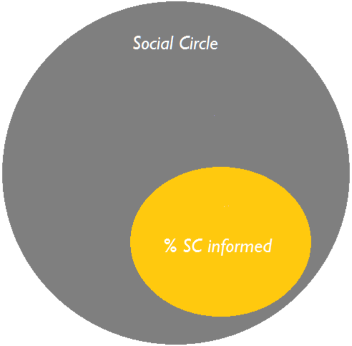
'Approximately how many people are there in your social circle of acquaintances?'



(Average: 53 approx.)

Proxy for connectedness: Social circle

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



(Average: 13% approx.)

Do social interactions influence expectations of returns?

- OLS Econometric specification:

$$Expec.\ R_i = \kappa_0 + \underset{(+)}{\kappa_1} k_i^* (+ \underset{(+)}{\kappa_2} D_i^e) + \kappa_3 Perc.\ R_i + \kappa_4 \rho_i + \kappa \boldsymbol{\tau}_i + w_i$$

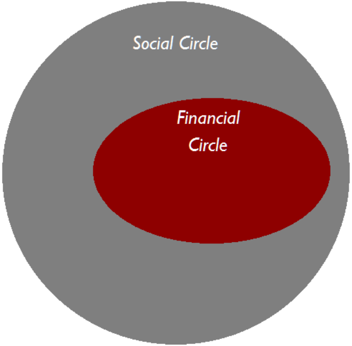
- Proxies for 'connectedness' k_i^* : $\%SC\ Inform$, $\%FC\ Inform$, $\%OC\ Inform$
- (Proxies for 'imitation' D_i^e : $\%SC\ Particip$, $\%FC\ Particip$, $\%OC\ Particip$)
- Risk aversion: CARA coefficient ρ_i
- Perceptions about (3-year cumulative) stock market returns: $Perc.\ R_i$
- Vector of individual characteristics, $\boldsymbol{\tau}_i$: Age, gender, marital status, No. of children at home, education, geographical region of residence, employment status, borrowing constraints, quartiles for total wealth, income and (last 12-month) saving.

Social interactions via expectations: Information

	Expec R	Expec R
% SC Inform.	0.000307	
	(0.000202)	
RA	-0.000708*	
	(0.000382)	
Controls	*Yes*	
Constant	0.0405**	
	(0.0170)	
F	2.805	
R^2	0.034	
Observations	2,535	2,535

Proxy for connectedness: Financial circle

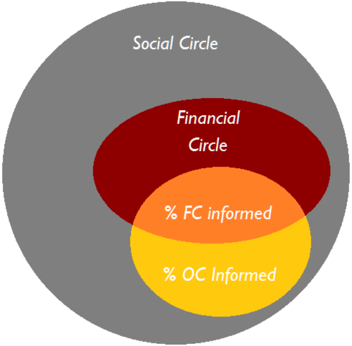
'With how many people from your social circle do you interact with regarding your financial/investment matters?'



(Average: 3 approx.)

Proxy for connectedness: Financial circle

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



(Average: 22% approx.)

Social interactions via expectations: Information

	Expec R	Expec R
% SC Inform.	0.000307	
	(0.000202)	
% FC Inform.		0.000301**
		(0.000118)
% OC Inform.		-4.32e-05
		(0.000191)
RA	-0.000708*	-0.000674*
	(0.000382)	(0.000385)
Controls	*Yes*	*Yes*
Constant	0.0405**	0.0429**
	(0.0170)	(0.0173)
F	2.805	3.075
R^2	0.034	0.037
Observations	2,535	2,535

Directly informative social interactions

- Tobit/Probit econometric specification:

$$D_i \equiv \%FW_i = \max\{0,\ \lambda_0 + \underset{(+)}{\lambda_1} k_i^* + \underset{(+)}{\lambda_2} Expec.\ R_i + \underset{(-)}{\lambda_3} \rho_i (+\underset{(0)}{\lambda_4} D_i^e) + \lambda \boldsymbol{\tau}_i + u_i\}$$

- Proxies for k_i^*: *%SC Inform*, *%FC Inform*, *%OC Inform*
- (Proxies for D_i^e: *%SC Particip*, *%FC Particip*, *%OC Particip*)
- Expected (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 of total wealth, income, and liquid savings

Pure information

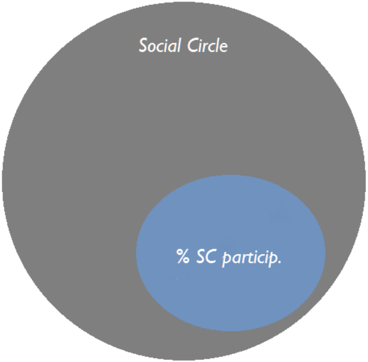
	Pr(Stock)>0	% FW	Pr(Stock)>0	%FW
% SC Inform.	0.00943***	0.234**		
	(0.00313)	(0.0973)		
% FC Inform.				
% OC Inform.				
Expec R	0.770**	35.20***		
	(0.321)	(11.54)		
RA	-0.0140**	-0.366*		
	(0.00626)	(0.192)		
Controls	*Yes*	*Yes*		
Constant	-1.107***	-37.53***		
	(0.296)	(9.264)		
Log-likelihood	-1214	-3637		
LR χ^2 (p-value)	401.7	370.3		
Pseudo R^2	0.160	0.0484		
Observations	2,525	2,294	2,525	2,294

Pure information

	Pr(Stock)>0	% FW	Pr(Stock)>0	%FW
% SC Inform.	0.00943***	0.234**		
	(0.00313)	(0.0973)		
% FC Inform.			0.00844***	0.142**
			(0.00177)	(0.0575)
% OC Inform.			0.00126	0.00784
			(0.00317)	(0.100)
Expec R	0.770**	35.20***	0.680**	33.40***
	(0.321)	(11.54)	(0.320)	(11.52)
RA	-0.0140**	-0.366*	-0.0137**	-0.380**
	(0.00626)	(0.192)	(0.00624)	(0.191)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Constant	-1.107***	-37.53***	-1.119***	-35.36***
	(0.296)	(9.264)	(0.302)	(9.331)
Log-likelihood	-1214	-3637	-1202	-3634
LR χ^2 (p-value)	401.7	370.3	435.4	376.3
Pseudo R^2	0.160	0.0484	0.168	0.0492
Observations	2,525	2,294	2,525	2,294

Selective imitation

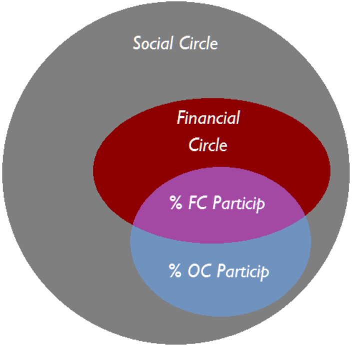
Repeat analysis but asking survey questions regarding the **participation** of acquaintances in the stock market...



Selective imitation: Financial circle

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

'In your opinion, what is the proportion of people in your financial circle that invests in the stock market?'



Social interactions via expectations: Selective Imitation

	Expec R	Expec R
% SC Particip.	0.000394	
	(0.000264)	
RA	-0.000702*	
	(0.000383)	
Controls	*Yes*	
Constant	0.0418**	
	(0.0170)	
F	2.792	
R^2	0.034	
Observations	2,535	2,535

Social interactions via expectations: (Selective) Imitation

	Expec R	Expec R
% SC Particip.	0.000394	
	(0.000264)	
% FC Particip.		0.000299***
		(0.000115)
% OC Particip.		-2.16e-05
		(0.000254)
RA	-0.000702*	-0.000684*
	(0.000383)	(0.000385)
Controls	*Yes*	*Yes*
Constant	0.0418**	0.0437**
	(0.0170)	(0.0170)
F	2.792	3.106
R^2	0.034	0.037
Observations	2,535	2,535

	Pr(Stock)>0	% FW	Pr(Stock)>0	%FW
% SC Particip.	0.0170***	0.277***		
	(0.00326)	(0.0977)		
% FC Particip.				
% OC Particip.				
Expec R	0.733**	34.49***		
	(0.323)	(11.53)		
RA	-0.0139**	-0.365*		
	(0.00621)	(0.192)		
Controls	*Yes*	*Yes*		
Constant	-1.170***	-36.88***		
	(0.295)	(9.249)		
Log-likelihood	-1206	-3635		
LR χ^2 (p-value)	419.0	373.9		
Pseudo R^2	0.166	0.0489		
Observations	2,525	2,294	2,525	2,294

	Pr(Stock)>0	% FW	Pr(Stock)>0	%FW
% SC Particip.	0.0170***	0.277***		
	(0.00326)	(0.0977)		
% FC Particip.			0.00783***	0.150**
			(0.00195)	(0.0599)
% OC Particip.			0.00684**	0.147
			(0.00333)	(0.105)
Expec R	0.733**	34.49***	0.678**	32.94***
	(0.323)	(11.53)	(0.320)	(11.53)
RA	-0.0139**	-0.365*	-0.0140**	-0.371*
	(0.00621)	(0.192)	(0.00622)	(0.191)
Controls	*Yes*	*Yes*	*Yes*	*Yes*
Constant	-1.170***	-36.88***	-1.153***	-36.72***
	(0.295)	(9.249)	(0.300)	(9.311)
Log-likelihood	-1206	-3635	-1203	-3632
LR χ^2 (p-value)	419.0	373.9	422.7	379.5
Pseudo R^2	0.166	0.0489	0.168	0.0497
Observations	2,525	2,294	2,525	2,294

Findings

- Information effect on stock market through expectations small
- Information effect sizable on decisions (both Tobit and Probit), conditioning on expectations
- E.g. if No. of people from the FC of a **typical investor** that follows the stock market goes up by 1

then this is associated with an increase in the % of financial wealth invested in the stock market of about **5 pp**
(corresponds to about €5K more invested in stocks for the average investor)

- Imitation effect absent...
- Although there are smaller albeit significant effects of share of **outer circle** participating on both expectations and stockholdings, also respondents' information is more in line with publicly available data $\Longrightarrow$ no evidence of mindless imitation (more below)
- Robust evidence supporting a positive effect of **informative social interactions**

Additional support for information channel

1. Effects by *direction of information flow* balance: those who both give and receive advice/information (to and from their FC) invest more in the stock market;
2. 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);

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 χ^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 χ^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 χ^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 χ^2 (p-value)	379.5	378.0
Pseudo R^2	0.0497	0.0495
Observations	2,294	2,294

Subjective Perceptions of Returns (Perc. R.)

	(1)	(2)	(3)	(4)	(5)
% SC Inform.		0.000849***			
		(0.000294)			
% FC Inform.			0.000353*		
			(0.000191)		
% OC Inform.			0.000476		
			(0.000295)		
% SC Particip.				0.00122***	
				(0.000336)	
% FC Particip.					0.000323*
					(0.000193)
% OC Particip.					0.000853***
					(0.000310)
Controls			*Yes*		
Constant	0.0741***	0.0613**	0.0614**	0.0598**	0.0620**
	(0.0253)	(0.0257)	(0.0259)	(0.0256)	(0.0256)
$F\ (p-value)$	5.430 (0)	5.229 (0)	5.100 (0)	5.397 (0)	5.263 (0)
R^2	0.0799	0.0841	0.0858	0.0876	0.0885
Observations	2255	2255	2255	2255	2255

Unobserved heterogeneity

1. We split individual social circles into financial and outer: we find no statistical evidence in support of outer circle effects, which also control for unobserved group heterogeneity;
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);
3. We conduct counterfactual placebo tests, by randomizing individual responses to questions on financial circle information: 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 (IVs 'unwise' and Heckman two-step 'unfeasible'), which supports the identification of an information endogenous peer effect (Blume et al. 2011, 2015).

	Pr(Holding stocks dir. or indir. > 0)			
% FC Inform.	0.00226***		-0.000459	
	(0.000469)		(0.000626)	
% OC Inform.	0.000337		2.84e-05	
	(0.000848)		(0.00105)	
% FC Particip.		0.00209***		-0.000543
		(0.000518)		(0.000646)
% OC Particip.		0.00183**		0.000799
		(0.000890)		(0.00115)
Expec. R.	0.182**	0.181**	0.213**	0.214**
	(0.0855)	(0.0856)	(0.0951)	(0.0950)
Controls			*Yes*	
Log-likelihood	-1202	-1203	-1167	-1126
LR χ^2 (p-value)	435.4 (0)	422.7 (0)	448.7 (0)	444.3 (0)
Pseudo R^2	0.168	0.168	0.161	0.165
Observations	2,525	2,525	2,422	2,342

E(% Fin.Wealth in Stocks|Hold. Stocks > 0)				
% FC Inform.	0.0359**		0.0109	
	(0.0145)		(0.0185)	
% OC Inform.	0.00198		0.0252	
	(0.0253)		(0.0309)	
% FC Particip.		0.0378**		0.0110
		(0.0151)		(0.0194)
% OC Particip.		0.0371		0.0300
		(0.0265)		(0.0346)
Expec. R.	8.423***	8.298***	9.395***	9.409***
	(2.914)	(2.912)	(2.974)	(2.975)
RA	-0.0958**	-0.0935*	-0.0997**	-0.103**
	(0.0483)	(0.0482)	(0.0497)	(0.0496)
Controls		*Yes*		
Log-likelihood	-3634	-3632	-3492	-3381
LR χ^2 (p-value)	376.3 (0)	379.5 (0)	361.5 (0)	353.3 (0)
Pseudo R^2	0.0492	0.0497	0.0492	0.0496
Observations	2,294	2,294	2,197	2,124

Unobserved Heterogeneity: Selection of FC

We treat group choice and behaviour within a group as a set of joint outcomes (Blume et al., 2011, 2015):

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

where k_i^* is agent i's expectation/perception of the share of peers in his FC informed about the stockmarket, $\%FC\ Informed$.

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

$Q_{ig} = \nu_1 k_{ig}^* + \nu_2 Expec\ R_i + \nu_3 \rho_i + \boldsymbol{\tau}_i \nu + \nu_{ig}$. If $g = \{FC, OC\}$, i chooses $\underset{g}{max} Q_{ig}$ on the basis of only the expected average peer information (or behaviour) that may occur, $k_{ig}^* = \{\%\ g\ Informed, (\%\ g\ Participating)\}$, then

$\Pr(FC_i > 0) = \Pr(Q_{iFC} - Q_{iOC} \geq 0)$.

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. Then u_i and $\nu_{iFC} - \nu_{iOC}$ correlated, $u_i = \rho(\nu_{iFC} - \nu_{iOC}) + \upsilon_i$, i.e. we should reject the 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 χ^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_0: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

Summary and going forward

- Theory suggests that the social interactions should improve 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 matter for stock market decisions are informative social interactions
- Main result: strong evidence of a **pure information channel**
- No (strong) evidence of mindless imitation in stock market decisions

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*

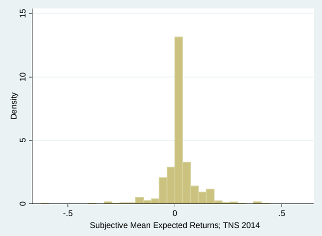
Appendix: Mean/Median Responses to Expec.R. and Perc.R. Questions

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



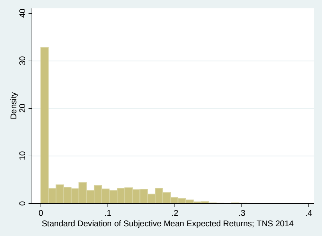


Figure 1a: Histograms of the subjective mean (left panel) expected five-year ahead cumulative return, and its standard deviation (right panel); TNS2014.

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

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

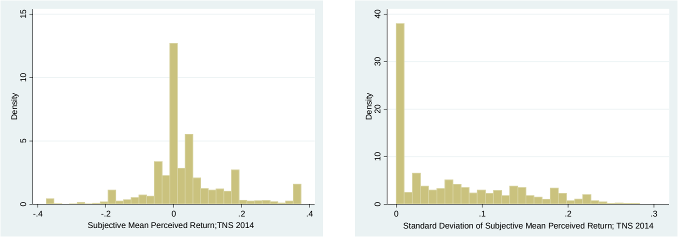


Figure 1b: Histograms of the subjective mean (left panel) perceived three-year cumulative realized return, and its standard deviation (right panel); TNS2014.

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 χ^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

MODEL (IV)
Main predictions

- When $n \longrightarrow \infty$:

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- When $n \to \infty$:
- The expected return for an investor i given his information set is

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

Agents with higher connectedness k_i^* react more to their pooled signal

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  Agents with higher connectedness k_i^* react more to their pooled signal
- The optimal individual demand for the risky asset of agent i is

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

  Agents with higher connectedness k_i^* trade more aggressively

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Main predictions

- When $n \to \infty$:
- The expected return for an investor i given his information set is

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

  Agents with higher connectedness k_i^* react more to their pooled signal
- The optimal individual demand for the risky asset of agent i is

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

  Agents with higher connectedness k_i^* trade more aggressively
- *Note: no need to know the exact network structure, only individual connectedness*