Is Gender in the Pocket of Investors? Identifying Gender Bias Towards CEOs with a Lab Experiment

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Job market for CEOs: Few female CEOs

- Fact #1: Women are persistently underrepresented in CEO positions.
    - US / Europe / Asia
- Broad research question in management: WHY do we observe so few female CEOs over time?
- Answers based on the supply-side (CEOs) and demand-side (firms) of the CEO job market
- On the demand-side: **glass ceiling** related to invisible barriers for women to advance in the corporate hierarchy, and *in fine* to become CEO
    - Internal barrier *inside* the firm related to the decision-making process (boards / hiring committees) not to appoint many female CEOs
    - NEW IDEA DEVELOPED IN OUR PAPER: External barrier *outside* the firm related to the reaction of investors who can trade (buy/sell) stocks following the appointment of a new CEO.

Stock market: Negative reaction to female CEOs appointment

- Fact #2: Negative stock market reaction following the appointment of a female CEO as found in Lee and James (2007) and Zhang and Qu (2013)
- Research question: WHY do we observe such a negative stock market reaction?
- This question is *important* because:
  - OUR VIEW: Boards and hiring committees may anticipate a negative stock market reaction from investors and then may be "discouraged" to appoint female CEOs (feedback effect from the stock market to the job market for CEOs).
  - Indeed, there may be a link between internal barrier (firm decision-making process) and external barrier (stock market reaction). Endogeneity issue.

Gender composition of the stock market

- Fact #3: few female working in the financial industry
  - Only 16 percent of holders of the chartered financial analyst (CFA) certification, one of the professional qualifications required to work in the financial industry, are women (Mattia, 2018)
  - Only 10 percent of US equity funds are managed by women (Niessen-Ruenzi and Ruenzi, 2019)
  - At the institutional level, only 14 percent of those with the highest decision-making powers in European financial institutions are women (EIGE, 2021).
- Our research work
  - We try to explain the relation between facts #1, #2 and #3.
  - We consider gender bias among investors.

Focus of our paper: The role of preferences

- Study of the *primitives* of the aggregate stock market reaction
  - If preferences matter, we have to look at *individuals* because preferences are at the individual level.
  - For our research design, we choose a lab experiment to study the preferences at the *individual* level. In practice, we use a trading simulation to study the *trading reaction* of participants.
- Focus of our research: gender bias among investors (in the secondary stock market) related to the CEO
  - Gender stereotypes (lack-of-fit hypothesis)
  - Double-standard theory (female leadership advantage)
  - Group bias (in-group favoritism and out-group discrimination)
  - We study the trading reaction of male/female market participants following the appointment of a male/female CEO.

Our hypotheses

- Hypothesis 1a: Gender stereotypes
  - Negative stereotypes against female CEOs or “Think CEO, think male” idea
  - When a *male* CEO is appointed, stock market participants *buy* stocks.
  - When a *female* CEO is appointed, stock market participants *sell* stocks.
- Hypothesis 1b: Double standards
  - Female leadership advantage (both communal and agentic characteristics)
  - When a *male* CEO is appointed, stock market participants *sell* stocks.
  - When a *female* CEO is appointed, stock market participants *buy* stocks.
- Hypothesis 2: group bias among stock market participants
  - Group bias based on gender with in-group favoritism and out-group discrimination
  - Market participants *buy* stocks when a CEO of their *own* gender is appointed.
  - Market participants *sell* stocks when a CEO of the *opposite* gender is appointed.
  - When a *male* CEO is appointed, male participants *buy* stocks and female participants *sell* stocks.
  - When a *female* CEO is appointed, female participants *buy* stocks and male participants *sell* stocks.

Our method: simulation-based lab experiment

- Use of a realistic simulation tool SimTrade
  - Simulation of the stock market for a firm (SunCar)
  - Series of events that unfold during the day. One of the events is the appointment of the new CEO for SunCar (a male CEO or a female CEO).
- Operationalization of our theoretical construct (preference towards the appointed CEO): **revealed** preferences through the trading activity of market participants.
  - You buy if you like the CEO. You sell if you don’t like the CEO.
- Randomized simulations with either a male CEO (50%) and a female CEO (50%)
  - Experiments provide better statistical results than empirical studies with always very few observations of firms led by a female CEO
- Participants
  - Students from a French business school witch a balanced population of female and male students
- Consequential experiment for participants
  - Incentive: bonus for the Finance course based on their performance in the simulation (the GPA is very important to go abroad for an exchange)

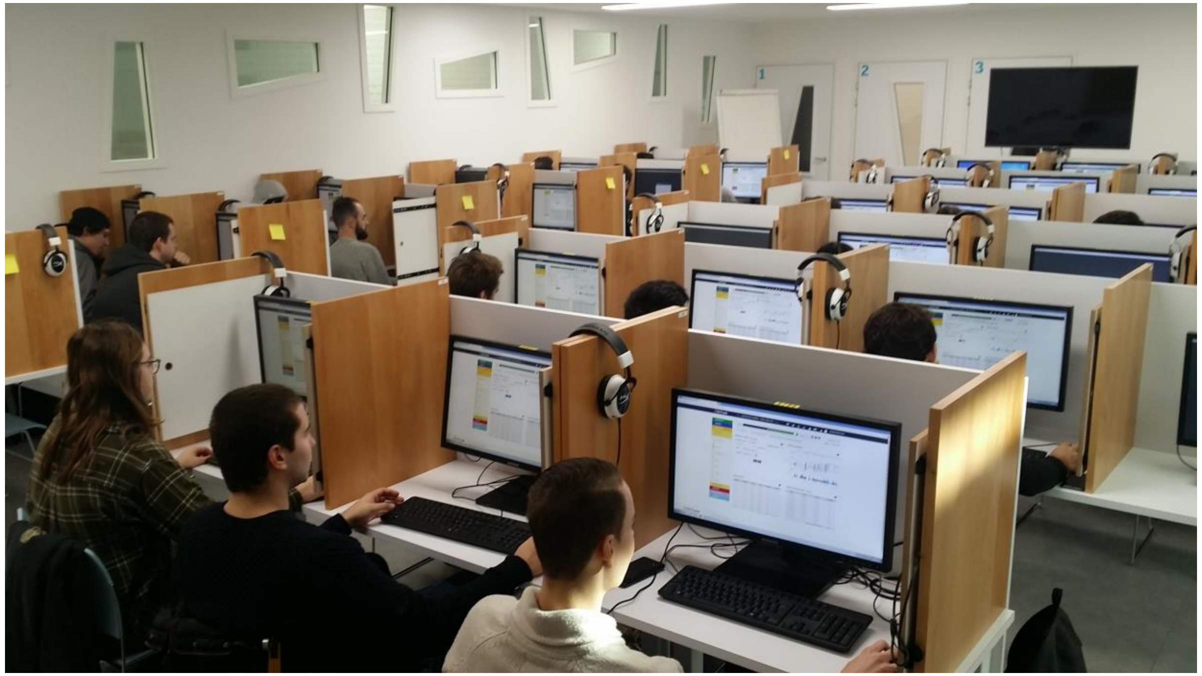
Advantages of simulation-based lab experiments

- Factors influencing the stock market reaction to CEO appointments:
  - The relative past performance of the firm (overperformance/underperformance)
  - The departure type (forced/voluntary)
  - The succession type (outsider/insider)
  - The firm characteristics relevant for the appointment (composition of the board, existence of nomination committee, involvement of the departing CEO, and gender diversity with the firm).
- Neutralization of these factors in our simulation
  - Same firm in the simulations except for the gender of the appointed CEO
  - We study **a pure gender effect** about the CEO (Goldberg paradigm).
  - Similar to the experiment by Adams, Kräussl, Navone and Verwijmeren (2017) to study the impact of the gender bias on pricing of art

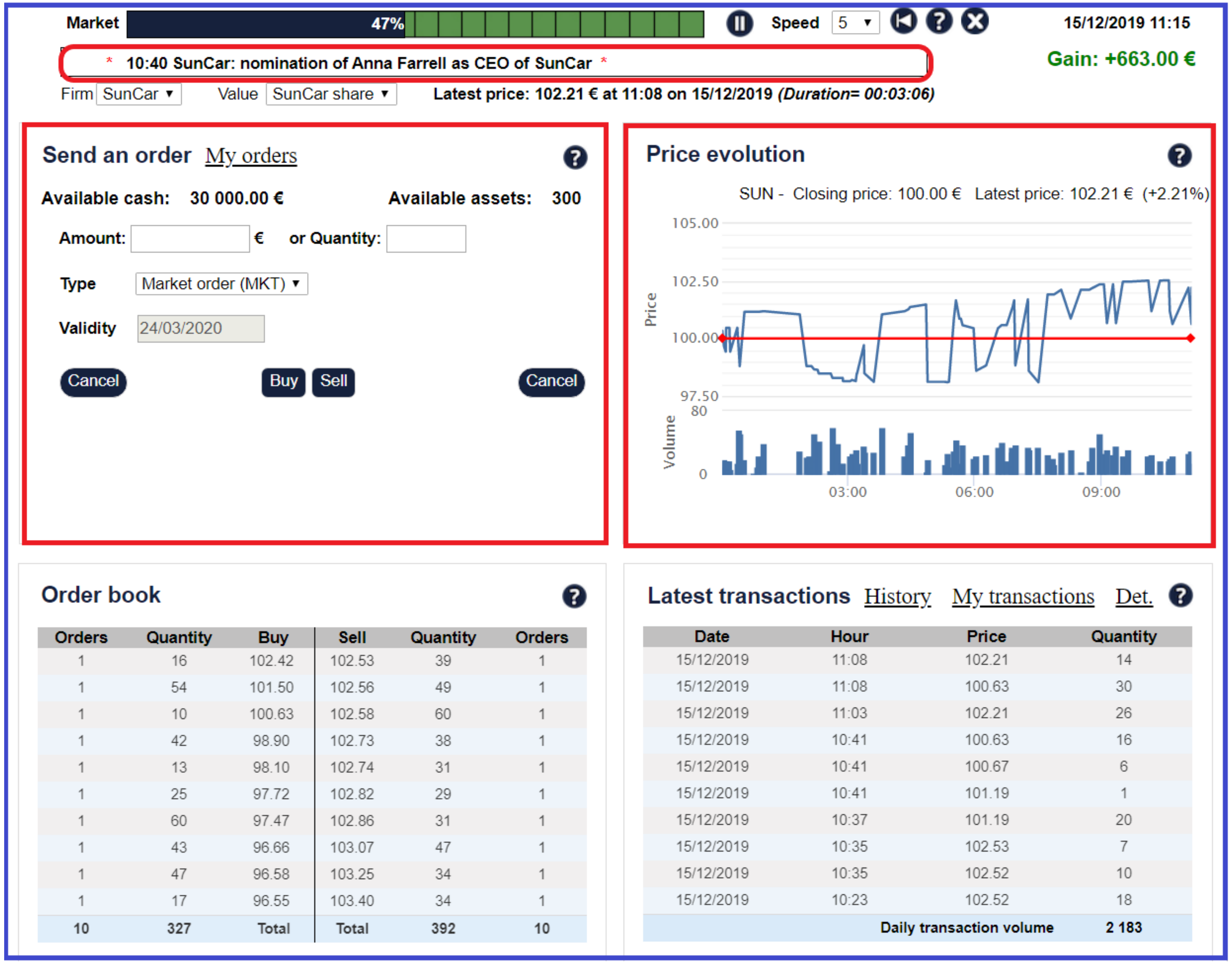
Advantages of simulation-based lab experiments

- Informational issues:
  - The exact date of the public announcement of the CEO appointment
  - The release of other news at the time of the CEO appointment
  - The strategic communication of the firm
  - The presentation of the event by the media
  - The limited attention from investors.
- Internal validity

ESSEC lab experiment



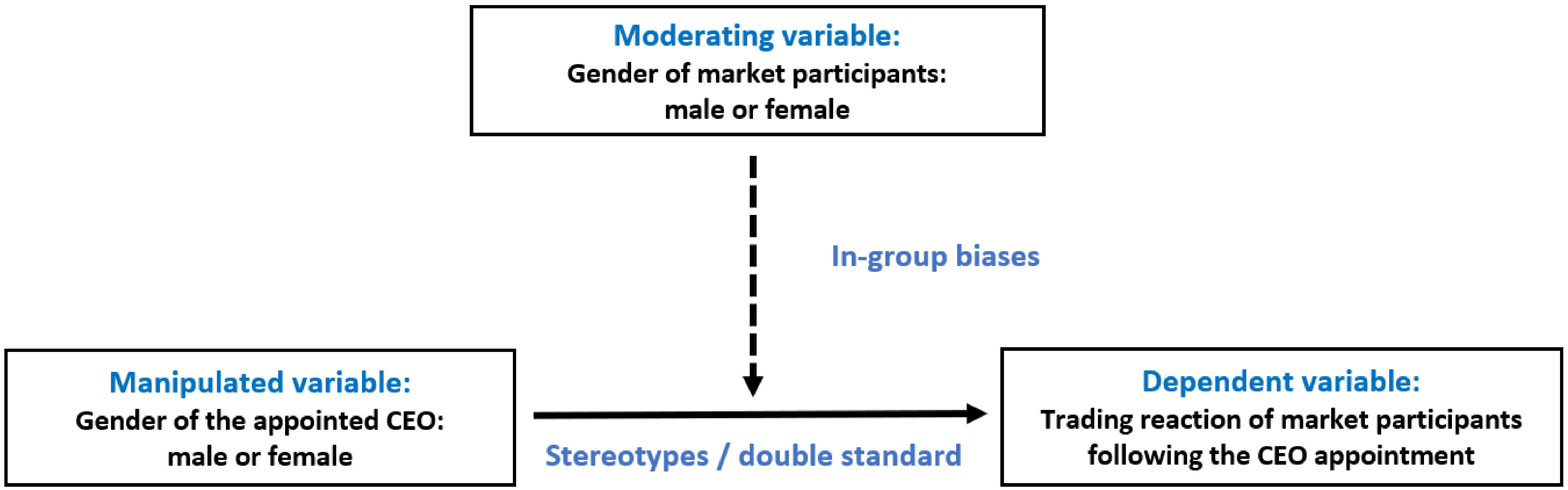
SimTrade trading simulation platform



Orders	Quantity	Buy	Sell	Quantity	Orders
1	16	102.42	102.53	39	1
1	54	101.50	102.56	49	1
1	10	100.63	102.58	60	1
1	42	98.90	102.73	38	1
1	13	98.10	102.74	31	1
1	25	97.72	102.82	29	1
1	60	97.47	102.86	31	1
1	43	96.66	103.07	47	1
1	47	96.58	103.25	34	1
1	17	96.55	103.40	34	1
10	327	Total	Total	392	10

Date	Hour	Price	Quantity
15/12/2019	11:08	102.21	14
15/12/2019	11:08	100.63	30
15/12/2019	11:03	102.21	26
15/12/2019	10:41	100.63	16
15/12/2019	10:41	100.67	6
15/12/2019	10:41	101.19	1
15/12/2019	10:37	101.19	20
15/12/2019	10:35	102.53	7
15/12/2019	10:35	102.52	10
15/12/2019	10:23	102.52	18
		Daily transaction volume	2 183

Relation between variables and our hypotheses



Data from our experiment

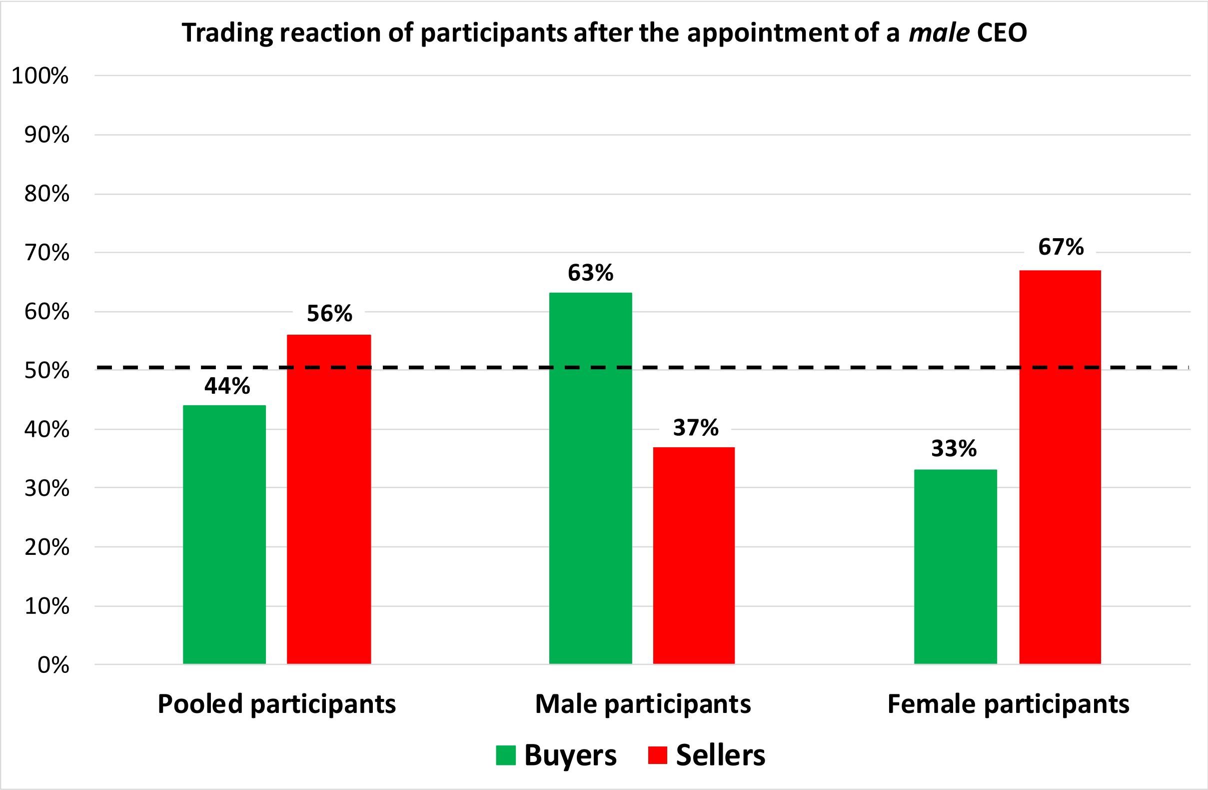
- Gender of the CEO (male/female depending on the variant of the simulation)
- Gender of the participant
- Trading reaction after the news about the CEO appointment (orders sent by participants to the market)
  - Participation to the market: yes (order) / no (no order)
  - Direction of the order: buy order / sell order
  - Quantity of the order: 100 stocks for example
  - Type of order: market order / limit order
  - Date/time of the order (time lapse after the news)

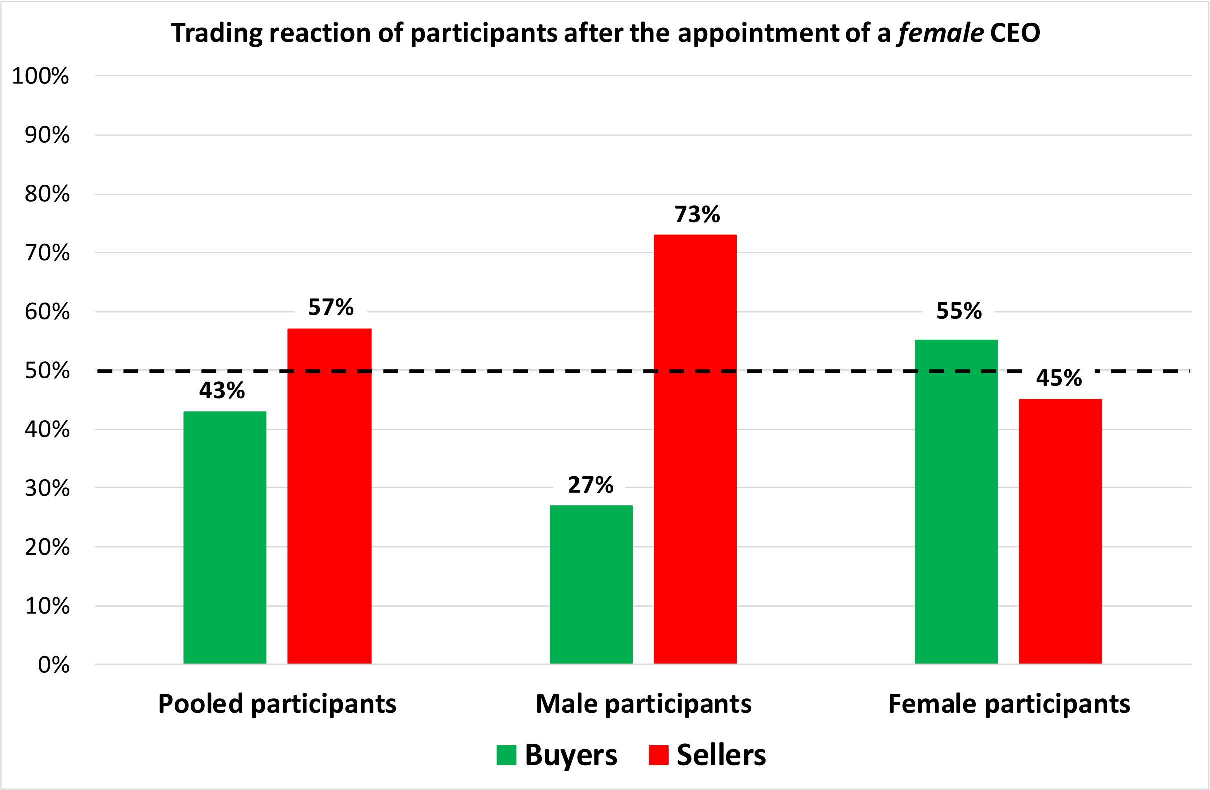
Trading reaction of male and female participants following the appointment of a male or female CEO

- What do you expect?

	Male CEO simulations	Female CEO simulations
Male participants	Buy? Sell?	Buy? Sell?
Female participants	Buy? Sell?	Buy? Sell?

Trading reaction after the appointment of a CEO





Measures

- Dependent variable (DV): the trading reaction of individuals (stock market participants) following the appointment of the new CEO
- We capture the trading reaction of each participant along two dimensions:
  - Qualitative dimension
    - Trading activity = Market participation x Order direction
  - Quantitative dimension
    - Trading intensity = Trading activity x Quantity of stocks x Probability of execution x Time lapse
    - We use three measures of the intensity of the market participation: the quantity of assets bought or sold (strength), the probability of execution related to the use of market or limit orders (aggressiveness), the promptness of execution related to the time lapse between the announcement of the new CEO and the stock market order sent by the participant (reactivity).

Statistical models

- Multinomial logit model for the qualitative dimension
- Linear regression model for the quantitative dimension
  - Trading intensity = $\alpha_0 + \alpha_1 \cdot$*CEO gender* + $\alpha_2 \cdot$*Participant gender*

    + $\beta \cdot$*CEO gender* $\times$ *Participant Gender*

    + $\gamma \cdot$Control variables + ε
  - *CEO gender*, *Participant gender* and the interaction term *CEO gender* $\times$ *Participant gender* are dummy variables (= 0 if male and 1 if female)
- Test of our hypotheses
  - Gender stereotypes: $\alpha_1 < 0$
  - Double standards: $\alpha_1 > 0$
  - In-group bias: $\beta > 0$.

Regression results

Table 3. Regression results for the participants' trading reactions following the appointment of the new CEO

	Dependent variable: participants' trading reactions			
	Trading activity		Trading intensity	
	(1)	(2)	(3)	(4)
Intercept	0.241 (0.403)	0.578 (0.817)	2.642 (20.406)	-14.075 (39.240)
CEO gender	-0.860 (0.618)	-0.862 (0.621)	-47.367 (26.679)	-49.737 (29.822)
Participant gender	-0.624 (0.523)	-0.608 (0.527)	-24.957 (26.531)	-26.836 (26.627)
CEO gender × Participant gender	1.685** (0.823)	1.711** (0.828)	78.123* (39.808)	80.472** (40.032)
Trading performance		$5.89 \cdot 10^{-6}$ $(1.96 \cdot 10^{-5})$		$1.02 \cdot 10^{-3}$ $(1.08 \cdot 10^{-3})$
Course grade		-0.027 (0.063)		2.210 (2.996)
Pseudo R^2/R^2	0.14	0.15	0.03	0.05
Observations	126	126	126	126

Stereotypes

$\alpha_1 < 0$

Double standards

$\alpha_1 > 0$

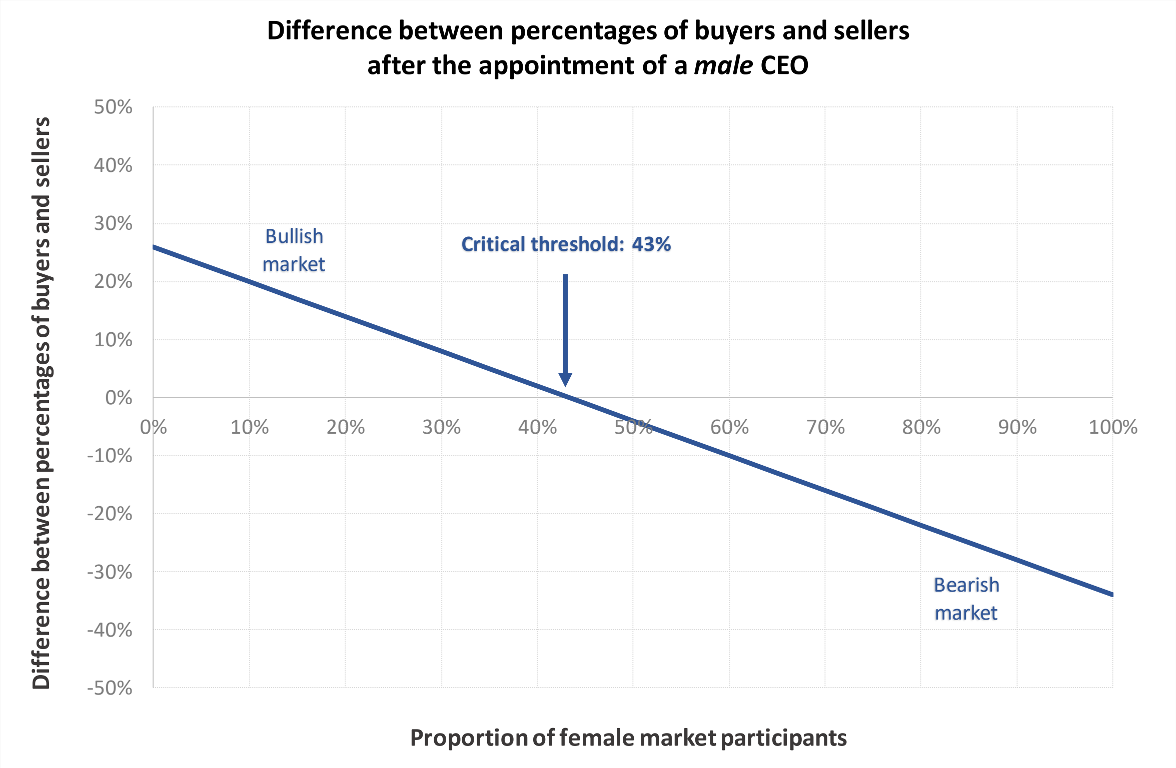
In-group bias:

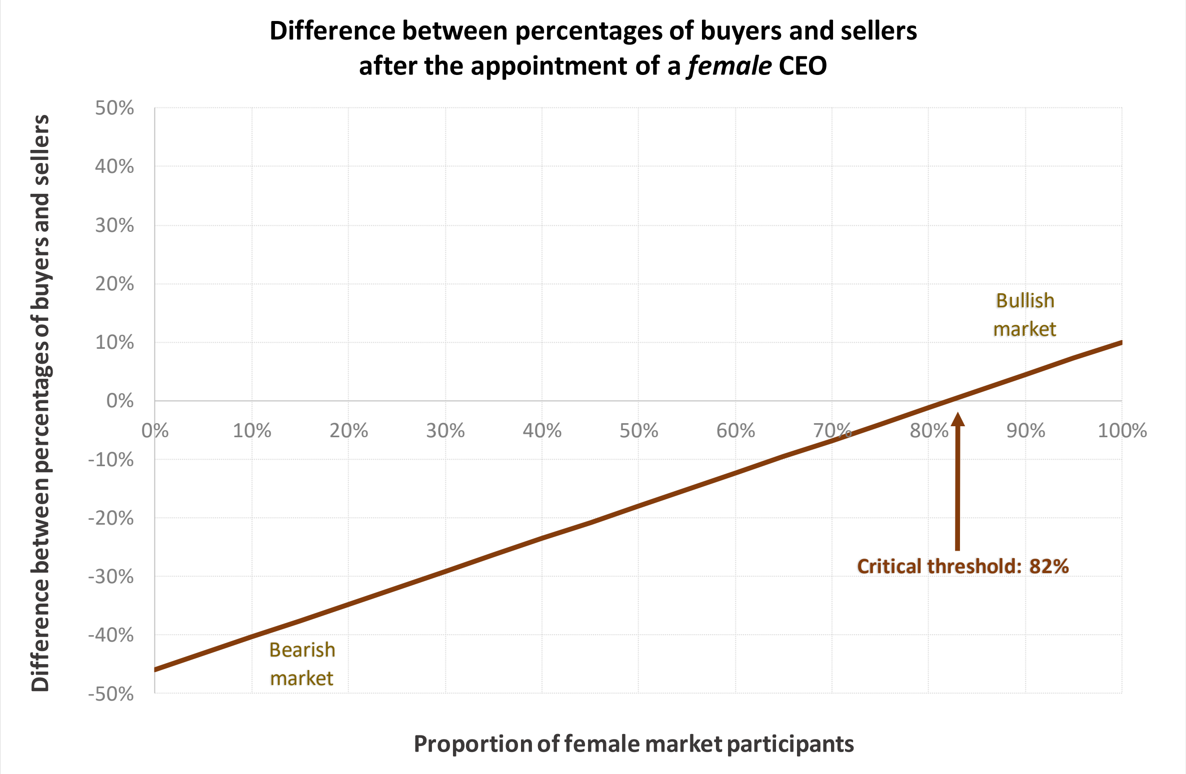
$\boldsymbol{\beta > 0}$

Further analysis: a thought experiment

- How would varying gender diversity among stock market participants influence the aggregate stock market reaction?
  - We use the buying and selling proportions estimated from the data of our experiment to calibrate the probabilities of buying and selling
  - Doing so, we assume that the individual buying/selling behavior does not depend on gender diversity

Economic significance: Market gender bias indicator





Further analysis: a thought experiment

- The threshold of female market participants that makes the market reaction gender-neutral to the appointment of a female CEO is equal to 82%!
- This is well above the current female representation in finance (less than 20%).
- Our thought experiment implies that the market is ‘gendered’, meaning that the gender composition of the market participants is not neutral to market outcomes.

Our contribution (1/2)

- Our result: we find evidence of group bias among investors related to the gender of the CEO.
  - Male investors tend to buy (sell) stocks following the appointment of a male (female) CEO.
  - Female investors tend to buy (sell) stocks following the appointment of a female (male) CEO.
  - Differences in gender preferences between men and women (revealed in our experiment by their trading activity)
- Reminder about Fact # 3: few female working in the financial industry
- Combining our result and Fact #3: this creates a gender-biased stock market against female CEOs.

Our contribution (2/2)

- A gender-biased stock market against female CEOs (due to the differences in preferences between men and women, and the gender composition of the stock market) may explain the negative stock market reaction following the appointment of a female CEO as found in empirical studies (Fact #2).
- The stock market reaction may be a component of the glass ceiling (external barrier). The stock market reaction is also taken into account by the decision-making bodies (hiring committees and boards) in their decision to appointment or not female CEOs (endogeneity). This could explain the persisting underrepresentation of women in CEO positions (Fact #1).

Policy implication: our recommendations

- Gender is not only an issue at the corporate level reflected in the need to appoint more female CEOs but also an issue at the financial industry level reflected in the need **to increase its gender diversity** by attracting more women in investment occupations.
- Also an issue at the societal level reflected in the need to change **individual and collective gender stereotypes** about leadership through training programs organized by financial institutions to educate investors.

Takeaway

- The market is gendered!
  - Differences in gender preferences between male and female investors
- Our contribution
  - Differences in preferences between men and women resulting in in-group bias + Low female participation in the finance industry

  $\Rightarrow$ Gendered-biased stock market with implication for the CEO job market

Further research

- We propose other institutions to reproduce the experiment to improve the externality of our results
  - Different countries, different cultures, different types of participants

Thank you!