Corporate Strategy, Conformism, and the Stock Market

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Real Effects of Stock Price Informativeness

- **Active Informant Hypothesis (Morck, Shleifer and Vishny (1990)):** Stock price informativeness matters for the real economy because stock prices are used as a source of information by decision makers (Firms' Managers, Firms' creditors, Regulators, central banks, etc.).

- **Fast growing theoretical and empirical literature on this hypothesis (see Bond, Edmans, and Goldstein (2012) for a survey).**

Ex-post vs. Ex-ante Influence of stock price informativeness

- The literature mostly focuses on **ex-post real effects** of the active informant hypothesis by **measuring the effect of stock prices on investment** (e.g., Chen, Goldstein, and Jiang (2007), Bakke and Whited (2010), or Foucault and Fresard (2012, 2014), Edmans and Jayaraman (2015)).
- **Our (new) point:** If managers rely on stock prices as a source of information, they may also **ex-ante** make **real decisions** to enhance their ability to learn information from stock prices in anticipation of future decisions (e.g., real options exercise).
- **In particular, we show that managers can enhance the informativeness of their stock price and thereby firm value by imitating other firms' strategies (product choices).**

The Conformity Effect: Intuition

- **Imitation of other firms' strategies (product choices) increases the correlation between a firm's cash-flows and its product market peers' cash flows.**

- $\Rightarrow$ **Imitation enhances the precision of the signal conveyed by stock prices to a manager about the payoff of his growth options because:**
  1. it makes his own stock price more informative (greater scope for cross stock learning by market makers) [OR]
  2. it gives the possibility for the manager to learn from his peers' stock prices.

- **Implication: Conformity Effect:** When firms learn information from stock prices, **they differentiate their products less than when they ignore information from stock prices.**

Testable Implications

- **Other things equal, the conformity effect is stronger for a private firm** because it can only learn information from its public peers' stock prices (his own stock price cannot be a source of information).
- $\Rightarrow$ **Prediction:** Firms' IPOs should be **positively** associated with an increase in their product differentiation.
- **We test this prediction for a sample of IPO firms**
- **We also test whether cross-sectional variations in differentiation patterns post IPOs are consistent with our theory:**
  1. Incentive to differentiate should be stronger when managers are better informed privately.
  2. Incentive to differentiate should be stronger when peers' stock prices are less informative.

Related literature

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- **Conformism in managerial decisions**
  - Reputation concerns (Holmstrm (1982), Scharfstein and Stein (1990)) or herding (Bikhchandani et al.(1998)) push towards conformism.
  - Our paper: Conformism is a way to enhance stock price informativeness

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- **Active Informant Hypothesis**
  - Most of the literature focuses on the effect of stock prices on investment (I-Q regressions)
  - Some papers have considered how managers can ex-ante seek to control the informativeness of their stock prices with (i) financial decisions (e.g., a cross listing; see Foucault and gehrig (2008)) or (ii) selective disclosure (e.g., Bond and Goldstein (2014)).
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  - Our focus on product differentiation is novel
- **Finance and product markets**
  - Many studies look at the impact of industry structures on asset prices (e.g., Peress (2010) or Hou and Robinson (2006))
  - We focus on the opposite: stock prices $\Longrightarrow$ product market structures

Timeline of the model

- **Date 1:** An entrant firm (A) chooses one of two strategies: (i) imitation of n incumbents (Strategy S_c) or (ii) differentiation from incumbents (Strategy S_u).

The manager of firm A chooses a strategy $S_A \in \{S_u, S_c\}$

- **Unique**: S_u
- **Common**: S_c: already followed by n firms

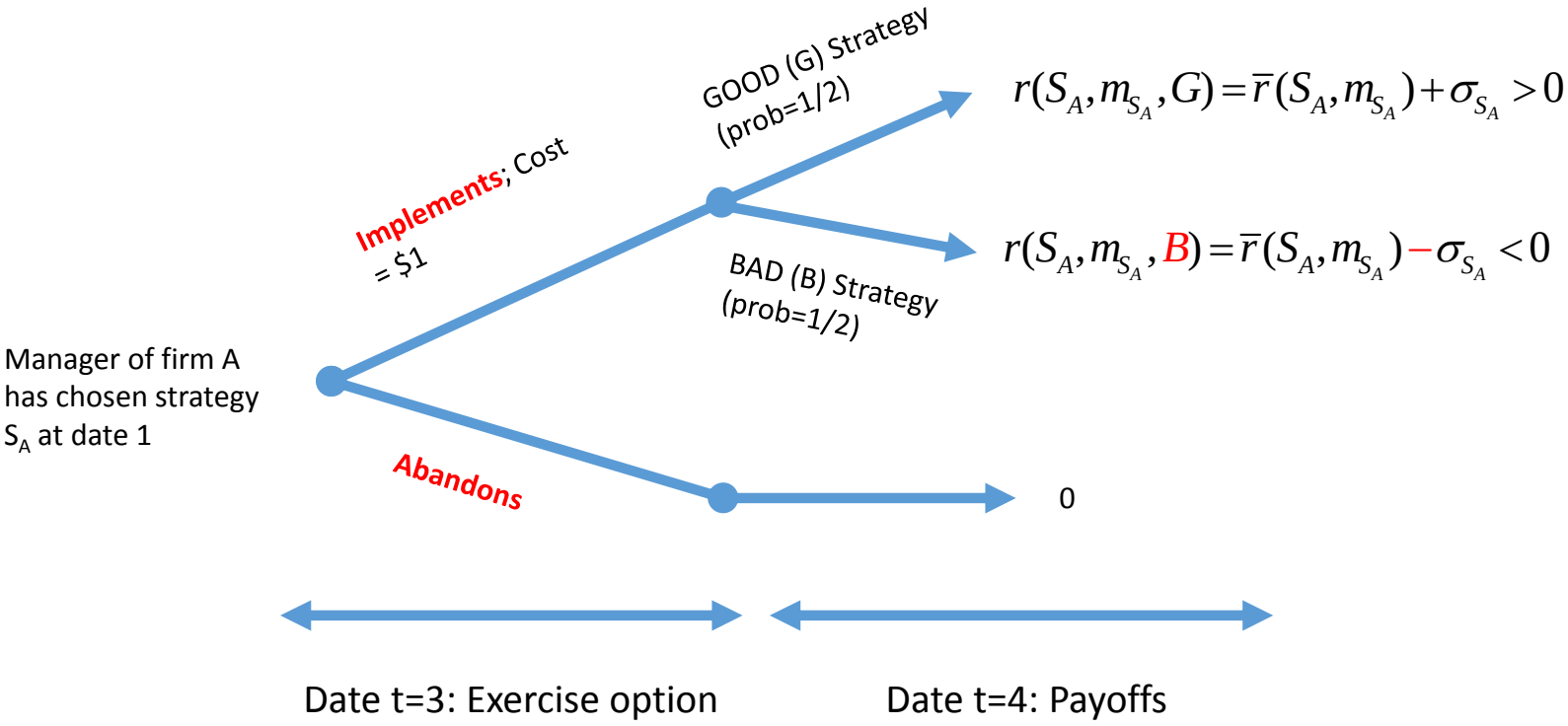
A strategy can be Good (G) or Bad (B) with equal probabilities.

Stock market opens:
order flows: $\{f_1,\ldots,f_n,f_A\}$) and **stock prices**: $\{p_1,\ldots,p_n,p_A\}$ are realized

- With probability γ, the manager of firm A receives a signal (s_m) about the type (**G or B**) of his strategy
- He observes stock prices realized at date 2.
- **He decides to exercise his growth option:**
  - Pay \$1 and pursue strategy S_A (**I=1**) or
  - Abandon strategy S_A (**I=0**) at zero cost.

Firms' cash flows ($r(S,m_S,t_S)$) are realized.

The Entrant Firm's Real Option (date 3)



Value of a Strategy

- **Let $I = 1$ if the manager pursues her strategy and $I = 0$ if she abandons it.**
- **Value of firm A at date 3 (ex-post):**

$$V_{A3}(S_A, I) = I \times E(NPV(S_A, m_{S_A}) | Stock \quad Prices, s_m)$$

where $NPV(S_A, m_{S_A}) = r(S_A, m_{S_A}, t_{S_A}) - 1$ is the firm's NPV if it pursues its strategy and m_{S_A} is the resulting number of firms following strategy S_A (1 if $S_A = S_u$ or $n+1$ if $S_A = S_c$).

- **Value of firm A at date 1 (ex-ante):**

$$\begin{aligned} V_{A1}(S_A) &= E(V_{A3}(S_A, I^*)) \\ &= E(Max\{0, E(NPV(S_A, m_{S_A}) | Stock \quad Prices, s_m)\}) \end{aligned}$$

- **No financing constraints or agency conflicts** $\rightarrow$ The manager chooses I^* and S_A^* to maximize the firm value at dates 3 and 1.

The Stock Market (date 2)

- **3 types of investors**
  - Continuum of risk-neutral speculators of mass 1.
  - Liquidity traders with agg. demand uniformly distributed for firm j on $[-1, 1]$
  - Risk neutral dealers

- **Speculators:**
  - Fraction π_c (π_u) receives a perfect signal about the type of S_c (S_u)
  - Each speculator can buy/sell one share of each firm

- **Trading: as in Kyle (1985):**
  - **Order flow in stock j is:** f_j = total demand from speculators and noise traders in firm j (speculators aggregate demand is $+/-\pi_c$ or $+/-\pi_u$).
  - **Absorbed by competitive and risk neutral dealers who observe flows in all stocks ("cross-asset learning"** $\Rightarrow$ set prices equal to their expectation of the final payoff of the firm given $\Omega_2 = \{f_1, f_2, ..., f_n, f_A\}$) (see Pasquariello and Vega (2015) for evidence).

The stock market equilibrium

- $p^*_{A2}(\Omega_2) = E(V_{A3}(I^*(\Omega_3, S_A), S_A)|\Omega_2)$
- $p^*_{j2}(\Omega_2) = E(r(S_c, m_{S_c}, t_{S_c})|\Omega_2)$ for $j =$ incumbent.
- **Feedback effect**
  1. The price of A **and** established firms depends on $I^*(\Omega_3)$
  2. $I^*(\Omega_3)$ depends on the stock price of all firms, in particular A.
  3. $\Rightarrow$ Jointly determined in equilibrium (fixed point)
- **A stock market equilibrium is a set** $\{x^*_{ij}(\cdot), p^*_{j2}(\cdot), I^*(\cdot)\}$
  1. The trading strategy of each speculator maximizes his expected profit
  2. Policy $I^*(\cdot)$ max. firm value at date 3
  3. Dealers set their prices such that they break-even (correctly anticipating $x^*_{ij}(\cdot)$ and I^*).

Cash-Flows: Assumptions

- **A.1: For identical types, uniqueness yields higher payoffs:**

$$\lambda(n) = \frac{Cash - Flow \quad of \quad Unique \quad Strategy \quad of \quad Type \quad x}{Cash - Flow \quad of \quad Common \quad Strategy \quad of \quad Type \quad x} > 1$$

- **A.2: The abandonment option has value.** The NPV of a good strategy is positive but the NPV of a bad strategy is negative.

- **Additional more technical assumptions:**
  1. **A.3: In the absence of information, doing nothing is optimal** The expected net present value of both strategies is negative in the absence of additional information at date 3.

  2. **A.4: A good common strategy with one entrant is better than a bad strategy with no entrant:** $r(S_c, n+1, G) > r(S_c, n, B)$

Benchmark: No Learning from stock prices

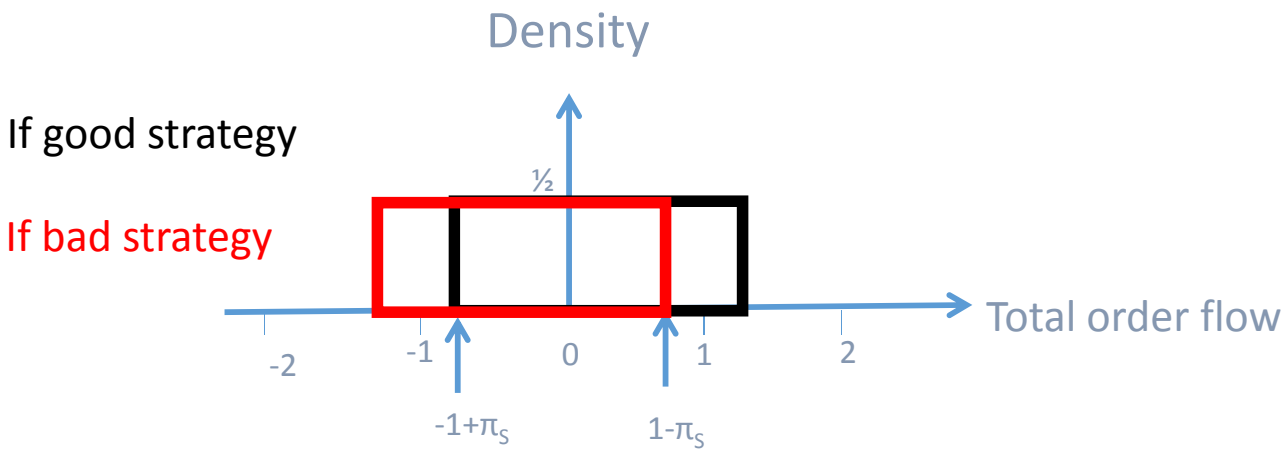
- The decision to exercise the abandonment option (I) is only driven by private managerial information.
- Hence, the value of the option only depends on the quality of managerial information γ.
- The manager should implement his strategy at date 3 if he learns that the strategy is good, and should do nothing otherwise.
- The expected value of firm A at date 1 with strategy S_A is therefore

$$V_{A1} = \frac{\gamma}{2}(r(S_A, m_{S_A}, G) - 1)$$

- **Result:** As $r(S_u, 1, G) > r(S_c, n+1, G)$ (Assumption A.1), **the manager chooses the unique strategy.**

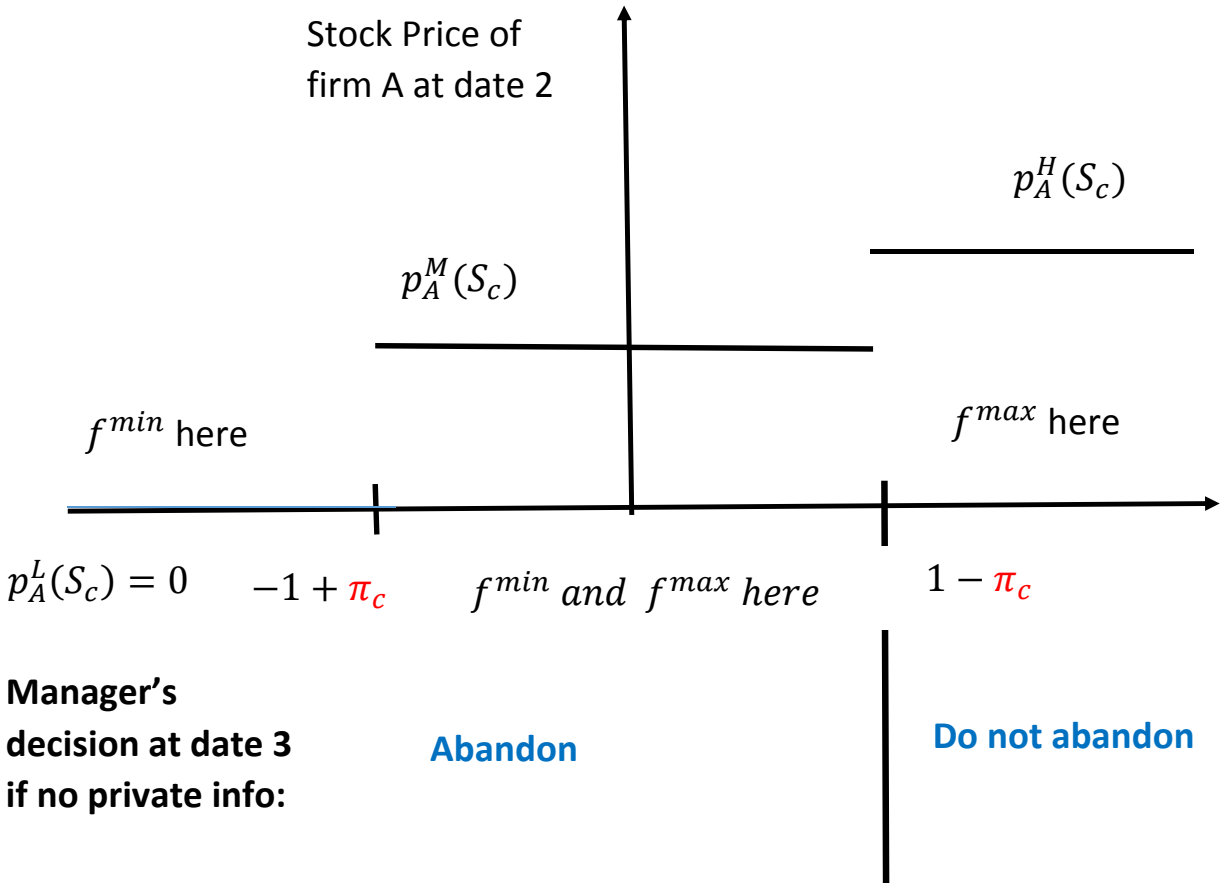
Stock market equilibrium with learning from stock prices 1/3

- Speculators buy stocks for which they have good signals; sell stocks for which the have bad signals.
- $\Rightarrow$ **Distribution of order flow in one stock following strategy** S



Stock market equilibrium with learning from stock prices 2/3

- **Case 1:** Firm A chooses the **common strategy** at date 1. Let f^{max} (f^{min}) be the largest (smallest) order flow realization across all stocks.



Stock Price Informativeness

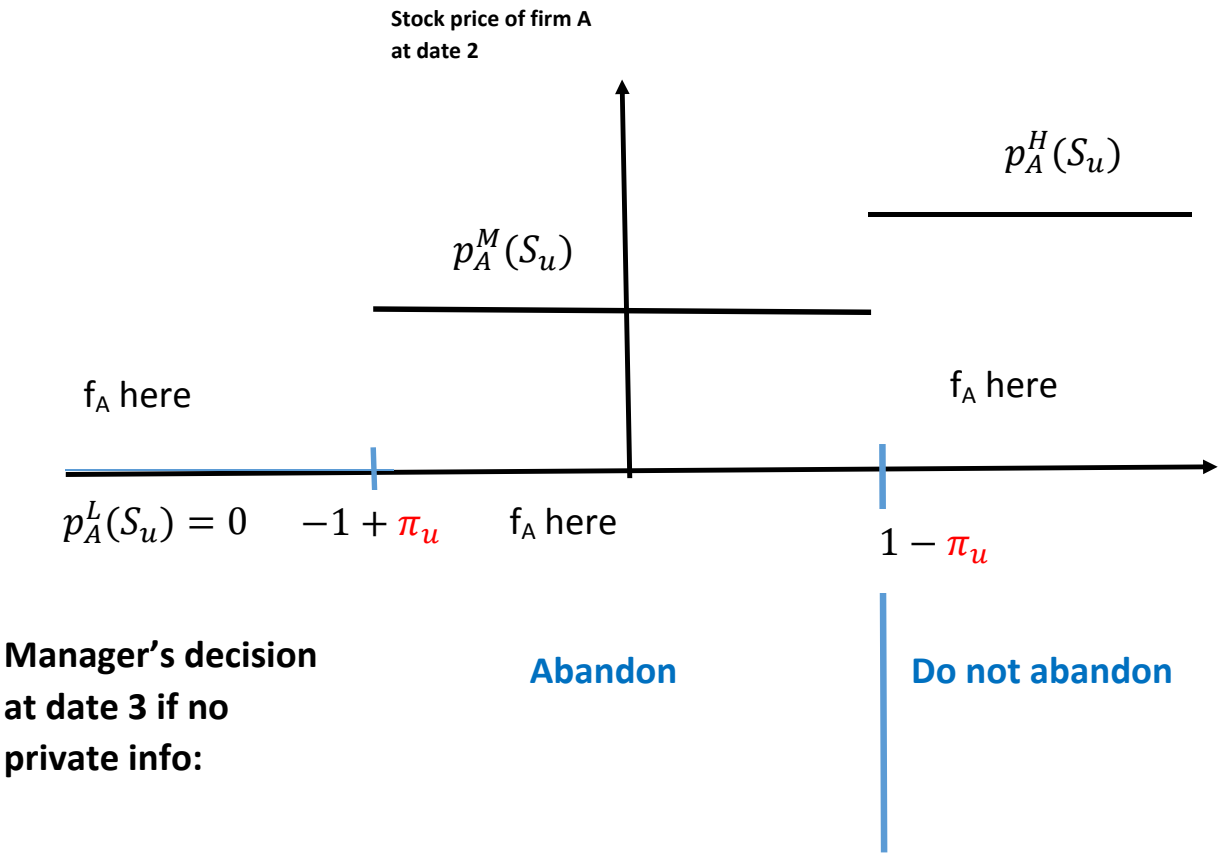
- **The manager's decision only depends on her own stock price because it is a sufficient statistic for all stock prices (dealers' risk neutrality + cross-asset learning).**
- **The likelihood that her stock price is fully revealing about the type of her strategy when she chooses the common strategy is:**

$$\bar{\pi}(n, \pi_c) = 1 - (1 - \pi_c)^{(n+1)}$$

- Increase in n because of cross-asset learning by market makers.
- Note that if $n = 0$ (no incumbent firms), $\bar{\pi}(n, \pi_c) = \pi_c$, the fraction of informed speculators about the common strategy.

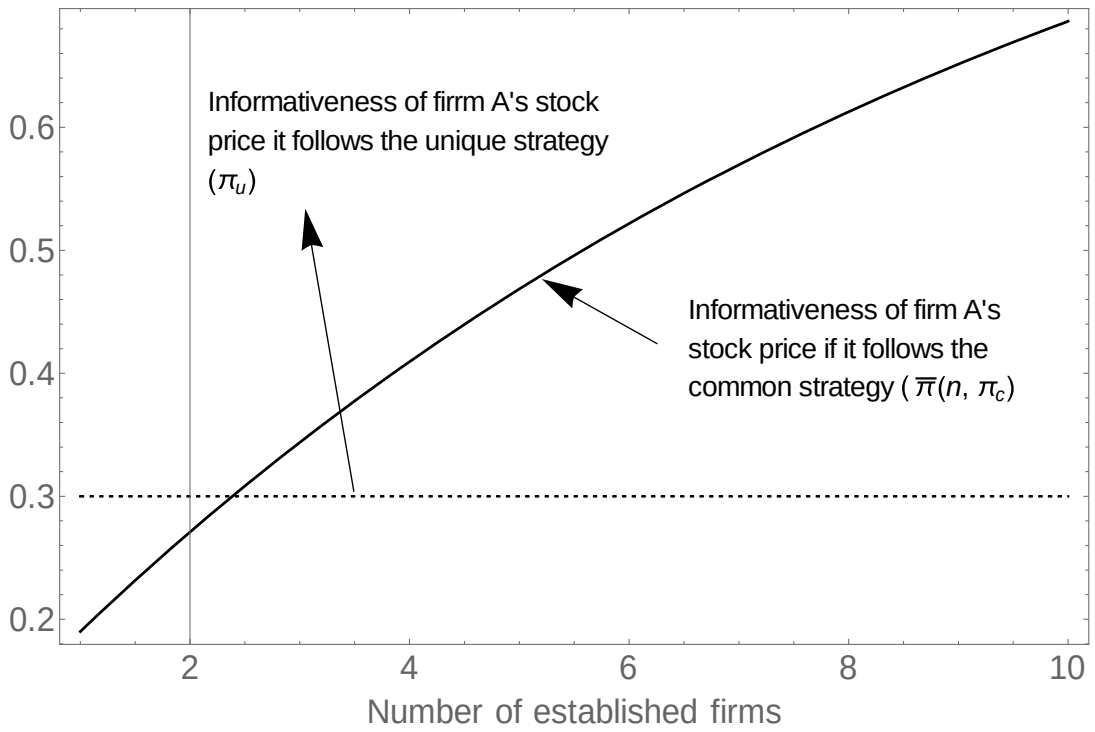
Stock market equilibrium with learning from stock prices

- **Case 2:** Firm A chooses the **unique strategy** at date 1.



Cross-Learning enhances stock price informativeness 3/3

- If $\pi_u < \bar{\pi}(n, \pi_c)$ then the stock market **is more informative about** the type (good/bad) of **the common strategy** than about the type of the unique strategy.
- **Cross asset learning effect:**



Stock Price Informativeness vs. Uniqueness

- **The value of firm A at date 1 if it chooses the common strategy:**

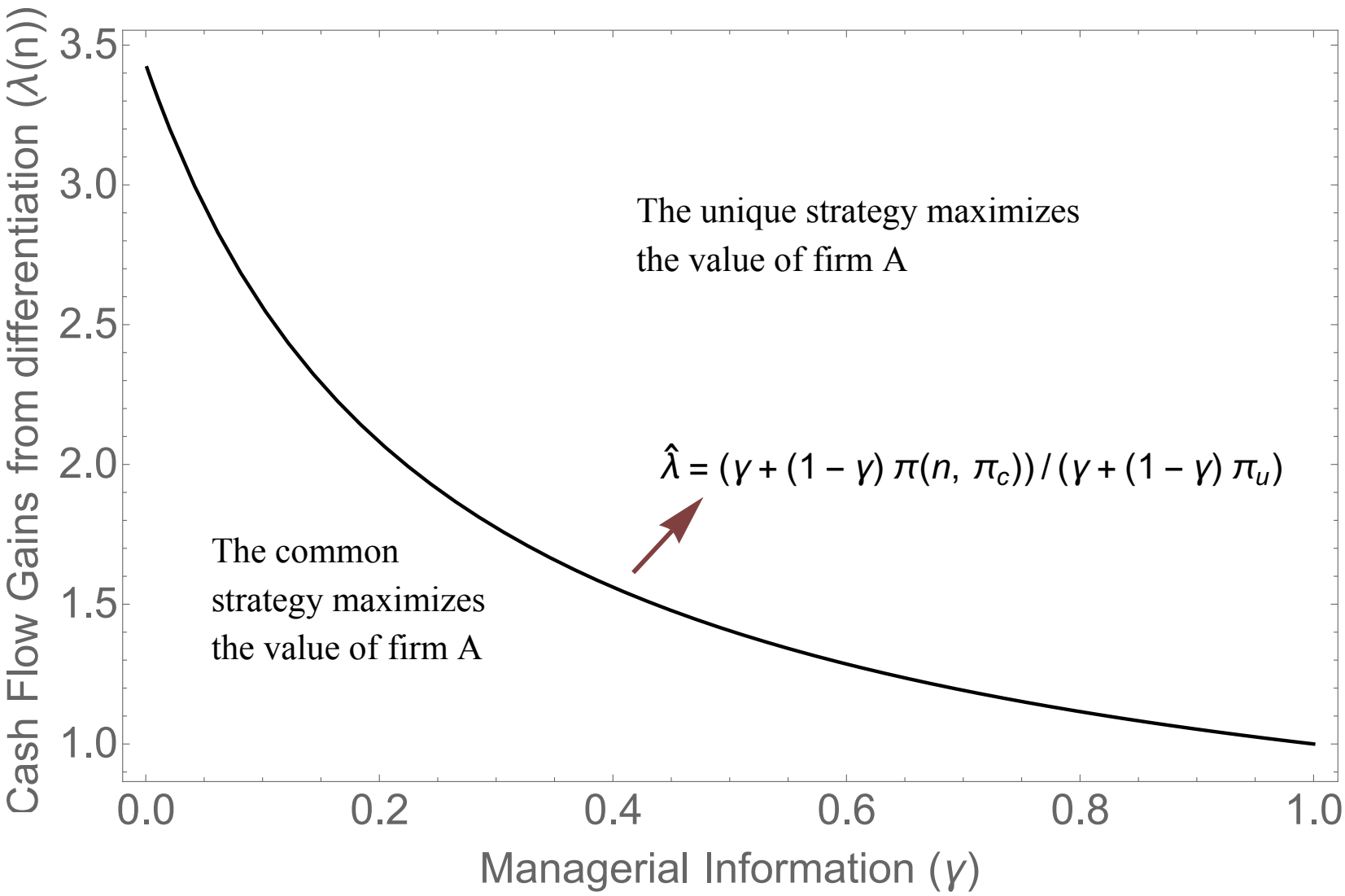
$$V_{A1}(S_c) = [\frac{\gamma + (1-\gamma)\bar{\pi}(n, \pi_c)}{2}](r(S_c, n+1, G) - 1).$$

- **The value of firm A at date 1 if it chooses the unique strategy:**

$$V_{A1}(S_u) = [\frac{\gamma + (1-\gamma)\pi_u}{2}](r(S_u, 1, G) - 1).$$

- **Trade-off:**
  1. The unique strategy has a higher payoff holding the type of each strategy identical (e.g., both are good).
  2. **BUT:** The stock market is less informative about the type of the unique strategy $\Rightarrow$ the value of the abandonment option is lower with this strategy.

Conformity effect (if $\pi_u < \bar{\pi}(n, \pi_c)$)



Conformity effect ($\pi_u > \bar{\pi}(n, \pi_c)$)

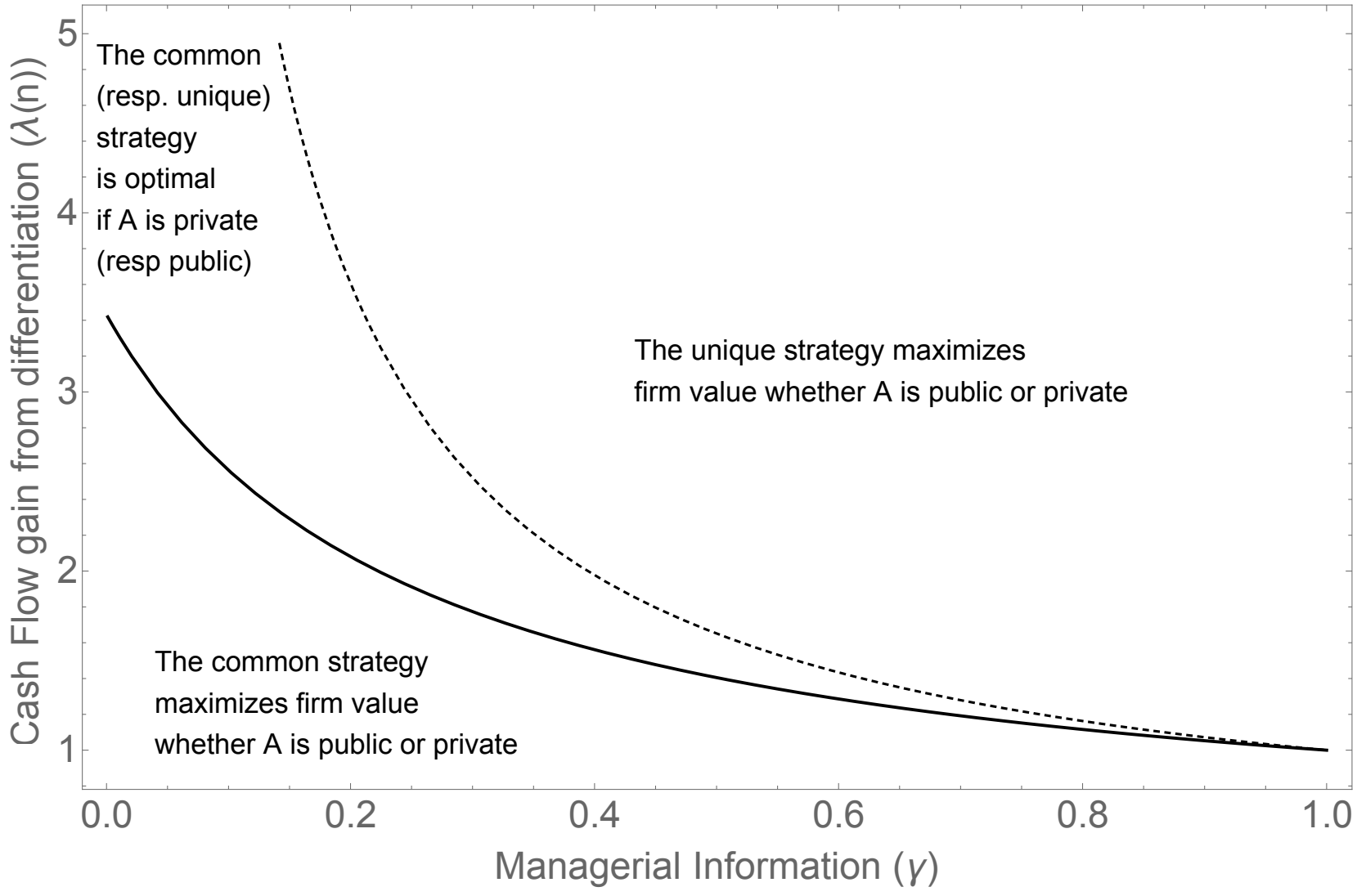
- If $\pi_u > \bar{\pi}(n, \pi_c)$, no conformity effect.
- However, even if $\pi_u > \pi_c$, **the case $\pi_u < \bar{\pi}(n, \pi_c)$ obtains for n large enough due to cross-market learning.**
- **Still true if production of information about a strategy is endogenous:** in equilibrium, $\pi_u^* < \bar{\pi}(n, \pi_c^*)$ for n large enough because speculator can amortize the cost of information production about the common strategy over a larger number of stocks.

How can we test the conformity effect?

Private vs Public Firms

- $\pi_u = 0$ for private firms (no stock price), but $\bar{\pi}_c(n, \pi_c) > 0$.
- **Thus, compare two identical firms A but one is private and the other public.**
  1. The **drop in the value of the abandonment option with the unique strategy is larger** for the private firm **because the drop in stock price informativeness is larger for the private firm**.
  2. $\Rightarrow$ The set of parameters for which the private firm chooses the common strategy is larger.
  3. $\Rightarrow$ The conformity effect is stronger for private firms, other things equal.
- **Testable Implication:** On average, firms should become increasingly differentiated after going public.

Conformity effect: Private vs. Public Firms



Extensions

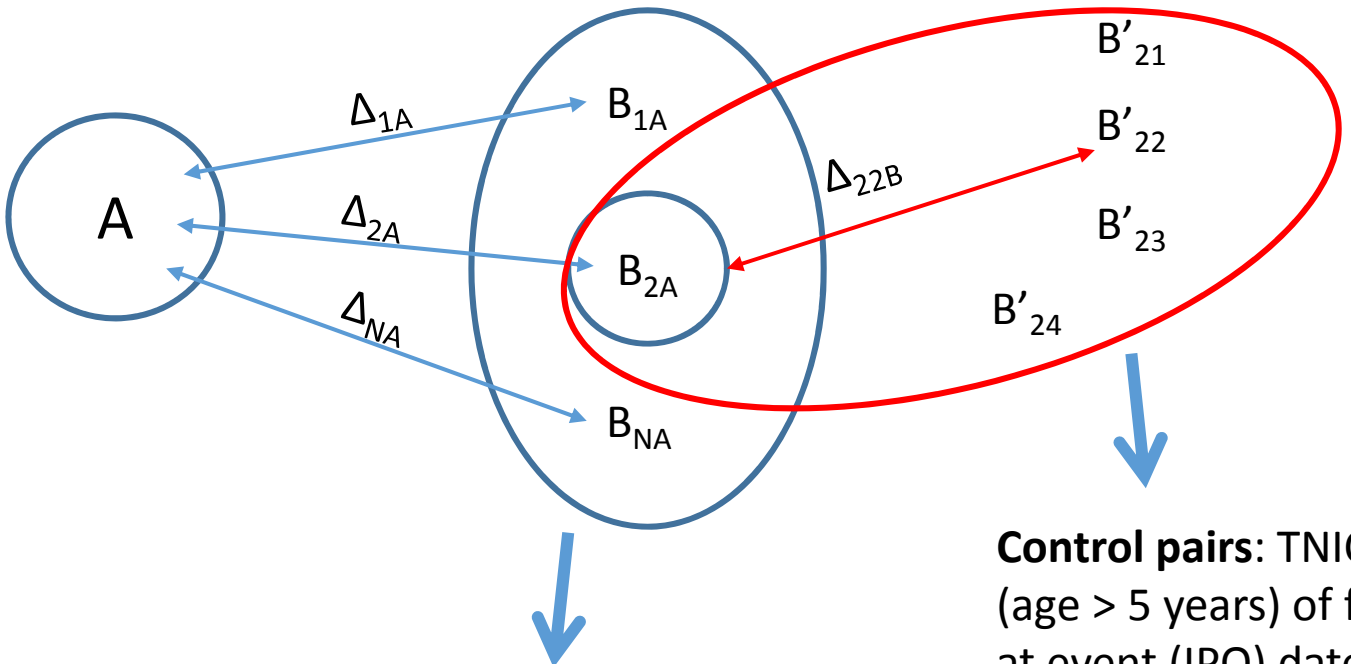
- **All previous results are robust when:**
  1. The prior likelihoods of success for the common and the unique strategy are different.
  2. The types (and therefore cash flows) of the unique and the common strategies are correlated.
  3. All firms have real options and endogenously choose their strategy at date 1.

Empirical Tests

Measure of Differentiation and IPOs

- **IPO firms**
  - IPO data from Jay Ritter (restrict to 1996-2011+filters)
  - Sample of 1,231 IPO firms
- **Product differentiation** $(\Delta_{i,j})$
  - Text-Based Network Classification (TNIC) of Hoberg and Phillips
  - Measure of product similarity between pairs of firms $(\rho_{i,j} \in (0 - 100\%))$ based on product description in firms' 10Ks
  - TNIC includes only firms with $\rho_{i,j} > 21\%$
  - Varies over time (period 1996-2011).
  - $\Delta_{i,j,t} = 1 - \rho_{i,j,t} =$ Measure of differentiation between i and j at date t.

Unit of Observation: Firm-Pairs



Treated pairs: TNIC Peers (age > 5 years) of firm A at event (IPO) date

Control pairs: TNIC Peers (age > 5 years) of firm B_{2A} at event (IPO) date (matched such that $\Delta_{BB'} \approx \Delta_{AB}$)

Econometric specification: Diff-in-Diff spirit

- We stack treated and untreated pairs in a large panel

$$\Delta_{i,j,\tau,t} = \eta_0 \tau + \eta_1 \tau \times \mathit{Treated}_{i,j,\tau,t}) + \alpha_{i,j} + \delta_t + \beta X_{i,j,\tau,t} + \varepsilon_{i,j,\tau,t}$$

1. $\tau \in \{0, 1, ..., 5\}$ years post IPO.
2. Pair fixed effects $\alpha_{i,j}$ capture time-invariant pair characteristics (e.g. λ_i)
3. Year fixed effects δ_t capture calendar-time effects
4. $\varepsilon_{i,j,\tau,t}$ is clustered within pairs

- $\eta_0 \times \tau$ measures change in diff. between date $\tau \geq 1$ and the IPO years for **ALL** pairs
- $(\eta_0 + \eta_1) \times \tau$ measures change in diff. in diff. between date $\tau \geq 1$ and the IPO years for **Treated** pairs (going public firms)
- η_1 measures the effect of the "treatment" (IPOs) in year τ
- $\eta_1 > 0 \Longrightarrow$ average IPO firm moves from S_c to S_u

Summary Statistics

τ=0	IPO firms	Established Peers	Peers of Peers
N	1 232	2 679	2 961
Age	0	13.535	14,307
$\Delta_{i,j}$	0,761	0,756	0,767
# of Peers	86,061	72,098	58,981
log(A)	4,988	5,666	5,617
MB	3,480	2,283	2,144

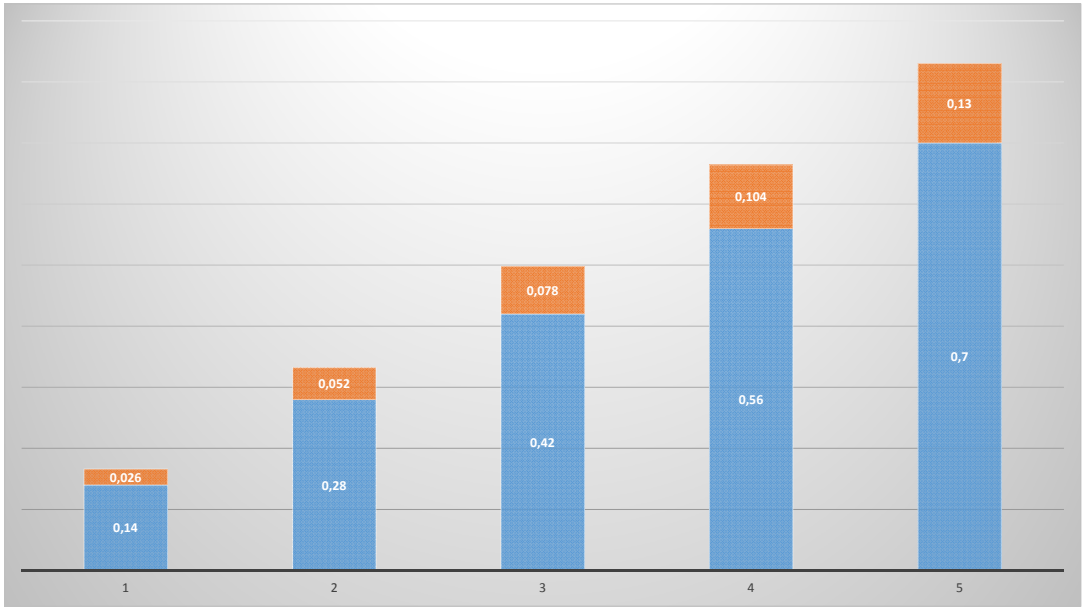
	Panel B: Pair-level		
τ=0	Treat=1	Treat=0	all
N	31 430	90 775	122 205
$\Delta_{i,j}$	0,754	0,762	0,760
Age_i-Age_j	-13,165	-2,129	-4,967
$log(A)_i$-$log(A)_j$	-0,969	-0,079	-0,308
MB_i-MB_j	1,089	0,214	0,439

	Panel C: Pair-year-level		
All τ	Treat=1	Treat=0	all
N	139 119	494 686	633 805
$\Delta_{i,j}$	0,759	0,768	0,766
Age_i-Age_j	-13,266	-2,082	-4,537
$log(A)_i$-$log(A)_j$	-0,847	-0,047	-0,222
MB_i-MB_j	0,426	0,109	0,178
τ	4,037	4,699	4,554

Main empirical finding - Differentiation increases after IPOs

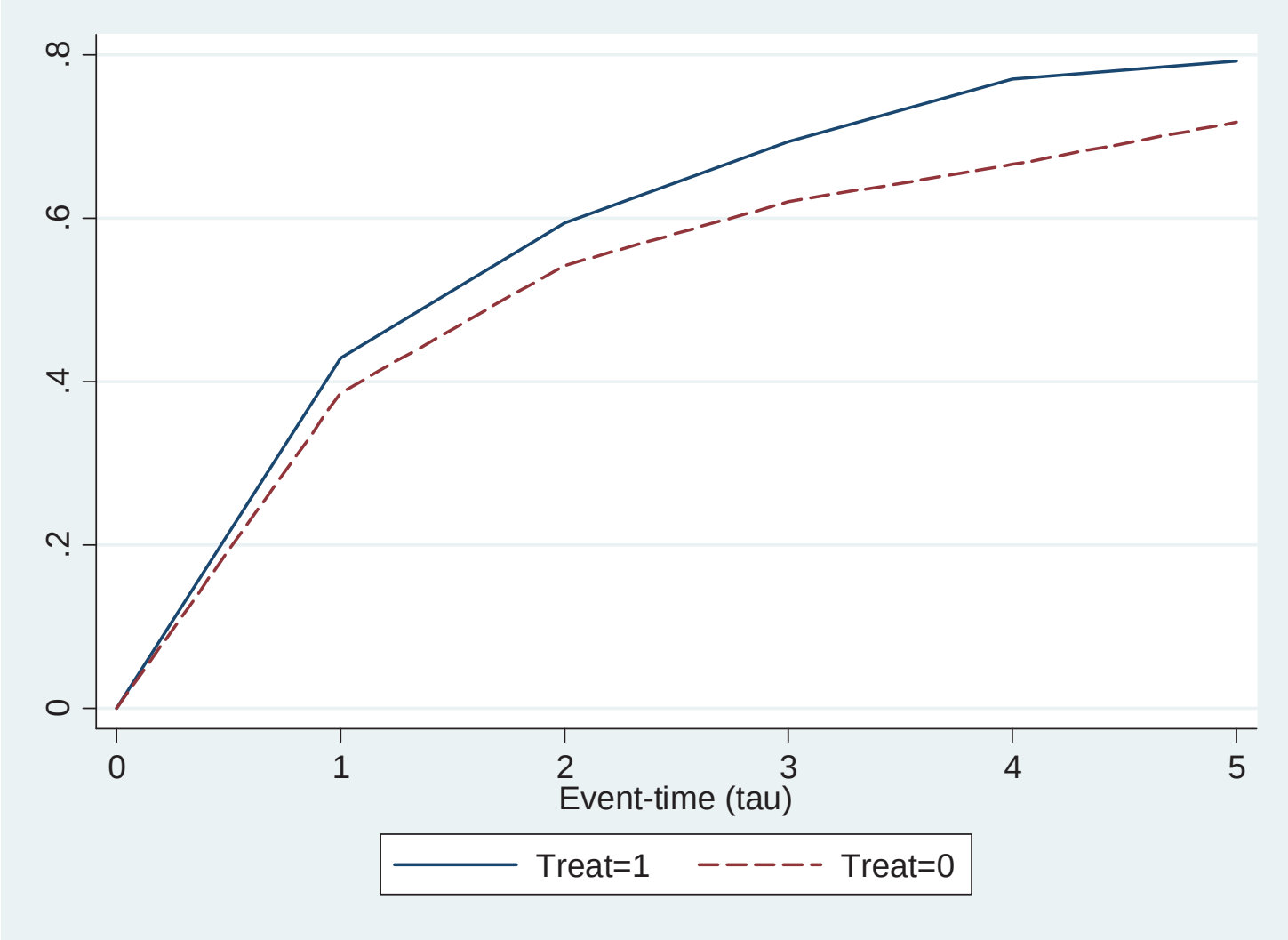
Dep. Variable:	Product Differentiation ($\Delta_{i,j}$)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		main	>3yrs	Age FE	M-5	M-size	Firm
τ	0.147***	0.142***	0.130***	0.156***	0.135***	0.146***	0.054***
	[62.92]	[57.34]	[50.53]	[77.33]	[70.91]	[55.95]	[9.11]
τ x Treat		0.026***	0.014**	0.021***	0.035***	0.021***	0.121***
		[4.75]	[2.52]	[4.08]	[6.46]	[3.78]	[4.85]
$\log(A)_i$-$\log(A)_j$		-0.024***	-0.014**	-0.035***	-0.020***	-0.070***	-0.193***
		[-3.72]	[-2.07]	[-5.58]	[-3.77]	[-10.11]	[4.73]
MB_i-MB_j		-0.007***	-0.004**	-0.011***	-0.007***	-0,002	-0.102***
		[-3.35]	[-2.04]	[-6.04]	[-4.35]	[-0.82]	[5.38]
Pair Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	No
Year Fixed Effects	Yes	Yes	Yes	No	Yes	Yes	Yes
(Age-Age) Fixed Effects	No	No	No	Yes	No	No	No
Firm Fixed Effects	No	No	No	No	No	No	Yes
Obs.	633 805	633 805	558 740	551 103	943 223	639 046	49 841
Adj. R^2	0,728	0,729	0,712	0,719	0,714	0,769	0,894

Main result - Interpretation



- Blue: Change in differentiation from IPO year to year τ for the control group.
- Blue + Orange: Change in differentiation from IPO year to year τ for the IPO group.
- Orange: Incremental effect for the IPO group.

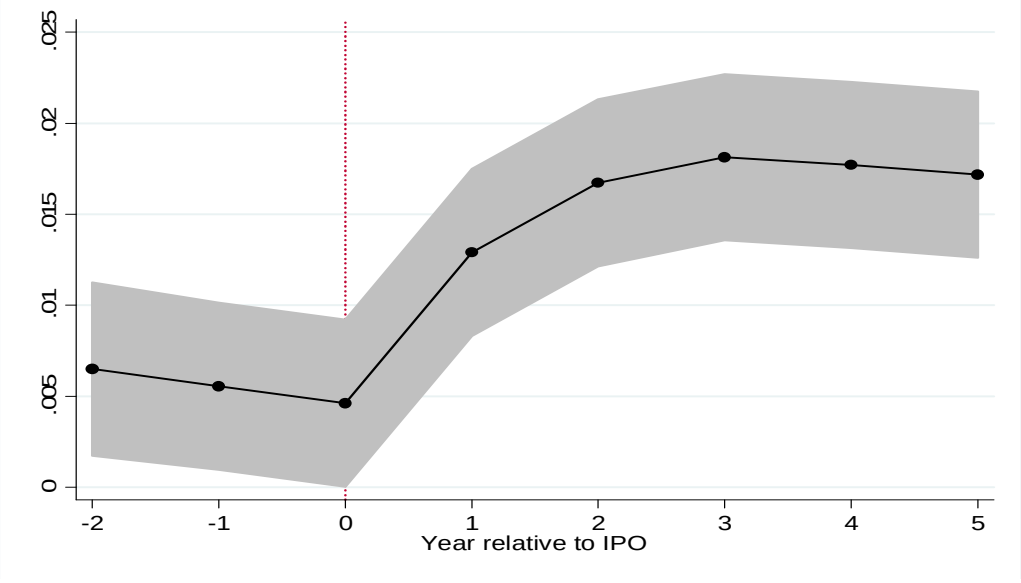
Main result - dynamics



Robustness Check

- **In our tests, we use the level of differentiation of pair (i, j) in the year of the IPO ($\tau = 0$) as a proxy for the level of differentiation of this pair before the IPO when firm i is private.**
- We check the validity of this assumption and the robustness of the findings for a subsample of 132 private firms for which we can observe differentiation pre-IPO (because some private firms must file 10Ks before IPOs).
- **We find that:**
  1. The level of product differentiation in the IPO year is **not** significantly different from two years before the IPO (no increase in differentiation before the IPO).
  2. It increases sharply immediately in the year following the IPO, in line with our hypothesis.

Dynamics of differentiation for private firms



Cross-sectional tests (model-based)

- The informational cost of differentiation
  - Decreases with γ (manager private information)
  - Increases with $\overline{\pi}(n, \pi_c)$ (price informativeness of peers)
- Hence, firms with better informed managers and/or less informative peers' stock prices are more likely to differentiate after their IPO.
- Quite UNIQUE to our story!

- Empirical proxies for managerial private information (γ)
  - Intensity of insider trading
    ($Insider_i$ = (Buy + Sell Insiders in Year t)/Trading Volume year t)
  - Performance of insider trades ($InsiderAR_i$)

- Empirical proxies for peers' stock price informativeness ($\bar{\pi}(n, \pi_c)$).
  - Probability of Informed Trading (PIN_j)
  - Ability of stock price to forecast earnings as in Bai et al. (2016) (BPS_j)

- Add interaction terms (i.e. triple-differences)

Managerial Information and Price Informativeness

Dep. Variable:	Produt Differentation (Δi,j)			
	Managerial Information		Peers' Price Informativeness	
ϕ:	$InsiderAR_i$	$Insider_i$	PIN_j	BPS_j
	(1)	(2)	(3)	(4)
τ	0.142***	0.142***	0.146***	0.125***
	[57.45]	[57.32]	[56.44]	[38.13]
τ x Treat	0.020***	0.018***	0.093***	0.083***
	[3.59]	[2.79]	[3.33]	[7.74]
τ x Treat x ϕ	0.022***	0.009**	-0.022**	-0.036***
	[5.39]	[2.19]	[-2.33]	[-5.78]
Control Variables	Yes	Yes	Yes	Yes
Pair Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs.	633 805	633 805	577 236	608 468
Adj. R^2	0,729	0,729	0,736	0,733

Alternative Explanations

- **Conclusion:** IPOs are positively correlated with subsequent differentiation and the effect varies with firm characteristics as predicted by our model.
- **Caveat:** We cannot discard the possibility that other mechanisms–"omitted variables"– drive our findings.
- However these variables must be:
  1. time-varying since we control for pair fixed effects.
  2. Unrelated to firm size and market to book ratios since we control for these variables.
  3. Strongly correlated with our proxies for managerial information and price informativeness to explain our cross-sectional findings.

Alternative Explanations

- **The financing of innovation and marketing channel**:
  1. Innovation and advertising is a way to differentiate but innovation requires financing
  2. IPOs relax financial constraints and allow firms to finance new innovations
  3. $\Rightarrow$ IPOs are positively related to differentiation
- **The diversification channel (Sha and Thakor (1988), Chod and Lyandres (2011)**:
  1. An IPO enables firms' owners to diversify (Sha and Thakor (1988)) and therefore to pursue riskier product market strategies (Chod and Lyandres (2011)) .
- **The monitoring/disciplining channel (Holmstrom and Tirole (1993)**:
  1. Private firms' managers can only be incentivized by writing contracts contingent on peers' stock prices $\Rightarrow$ Less incentive to differentiate.

Alternative Explanations

Dep. Variable:	Product Differentation ($\Delta i,j$)									
	Baseline		Managerial Information				Peers' Price Informativeness			
ϕ:			$InsiderAR_i$		$Insider_i$		PIN_j		BPS_j	
Panel A: Access to external finance (Availability of credit ratings, dividend payment, shares issuance, text-based measure of financing constraints)										
τ x Treat	0.014**	[2.30]	0,008	[1.26]	0,004	[0.67]	0.072**	[2.51]	0.065***	[5.77]
τ x Treat x ϕ			0.021***	[5.06]	0.011**	[2.41]	-0.020**	[-2.09]	-0.032***	[-4.94]
Panel B: Firms' policies (capex/assets, acquisition expenses/assets, advertising expenses/assets, #new patents/sales)										
τ x Treat	0.025***	[4.54]	0.019***	[3.41]	0.018***	[2.78]	0.088***	[3.11]	0.082***	[7.54]
τ x Treat x ϕ			0.023***	[5.41]	0.008*	[1.90]	-0.021**	[-2.15]	-0.035***	[-5.58]
Panel C: Insiders' diversification and risk-taking (Insiders net sales, firms' idiosyncratic volatility)										
τ x Treat	0.026***	[4.45]	0.020***	[3.37]	0.017**	[2.42]	0.080***	[2.62]	0.078***	[6.70]
τ x Treat x ϕ			0.022***	[4.88]	0.011**	[2.57]	-0.017*	[-1.63]	-0.033***	[-4.80]
Panel D: Monitoring (fraction of institutional investors in ownership, concentration of ownership)										
τ x Treat	0.024***	[4.36]	0.018***	[3.20]	0.016**	[2.46]	0.086***	[3.08]	0.081***	[7.55]
τ x Treat x ϕ			0.022***	[5.43]	0.009**	[2.21]	-0.020**	[-2.15]	-0.037***	[5.86]

Conclusion

- **How do stock markets affect real decisions when managers learn information from stock prices?**
  1. **Directly:** Stock prices cause a decision (e.g., investment).
  2. **Indirectly:** Managers make decisions to shape the informativeness of their stock price.
- **We provide theory and suggestive evidence for the second channel by considering differentiation decision by firms.**
  1. **Conformity effect:** Managers prefer not to differentiate because it lowers their ability to learn from stock prices.
- **Several possible extensions**
  1. **Learning externalities:** firms might inefficiently coordinate on projects with low expected payoffs
  2. Other decisions than product market differentiation.

Conclusion

THANKS