American Disclosure Options

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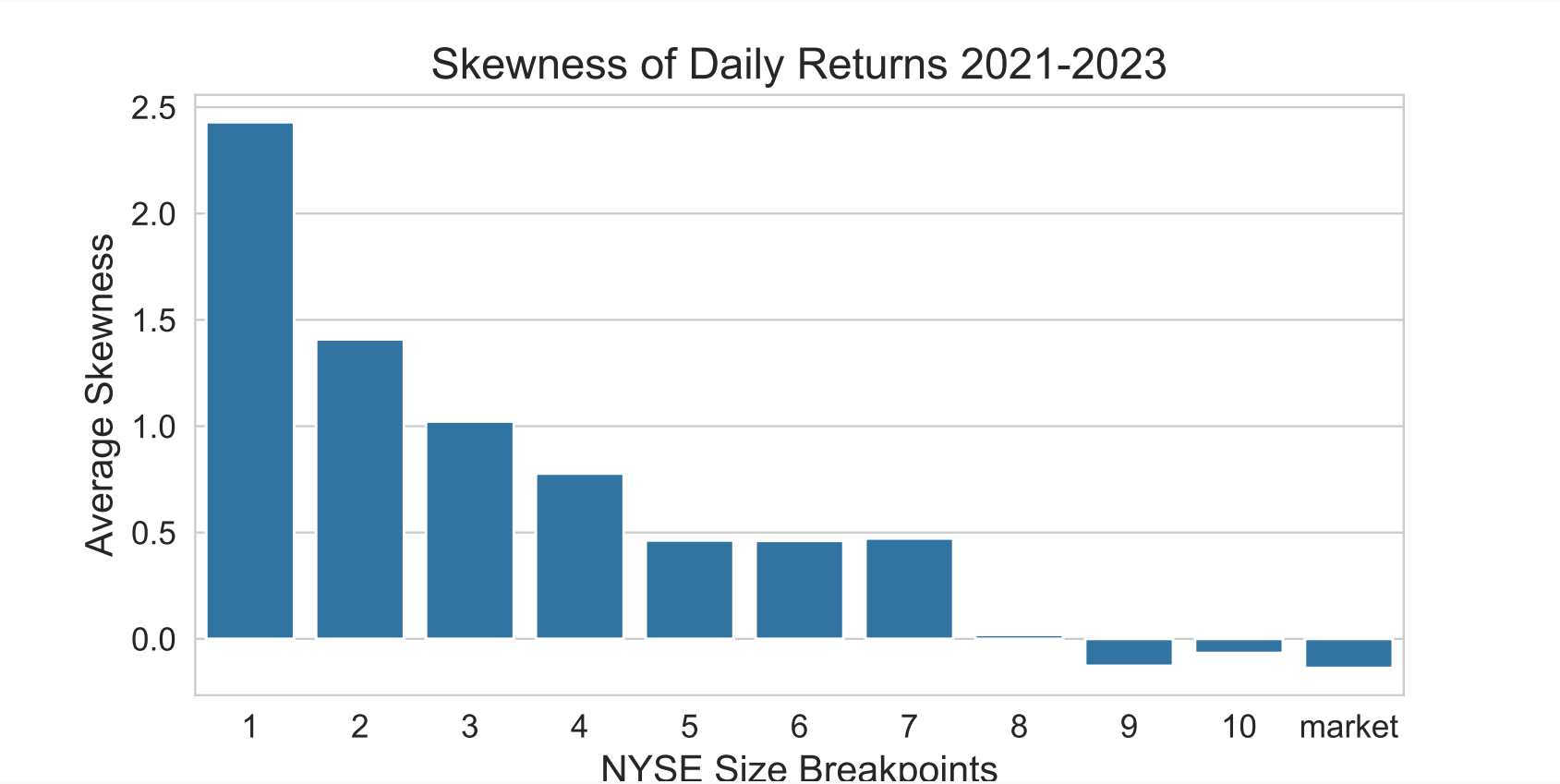
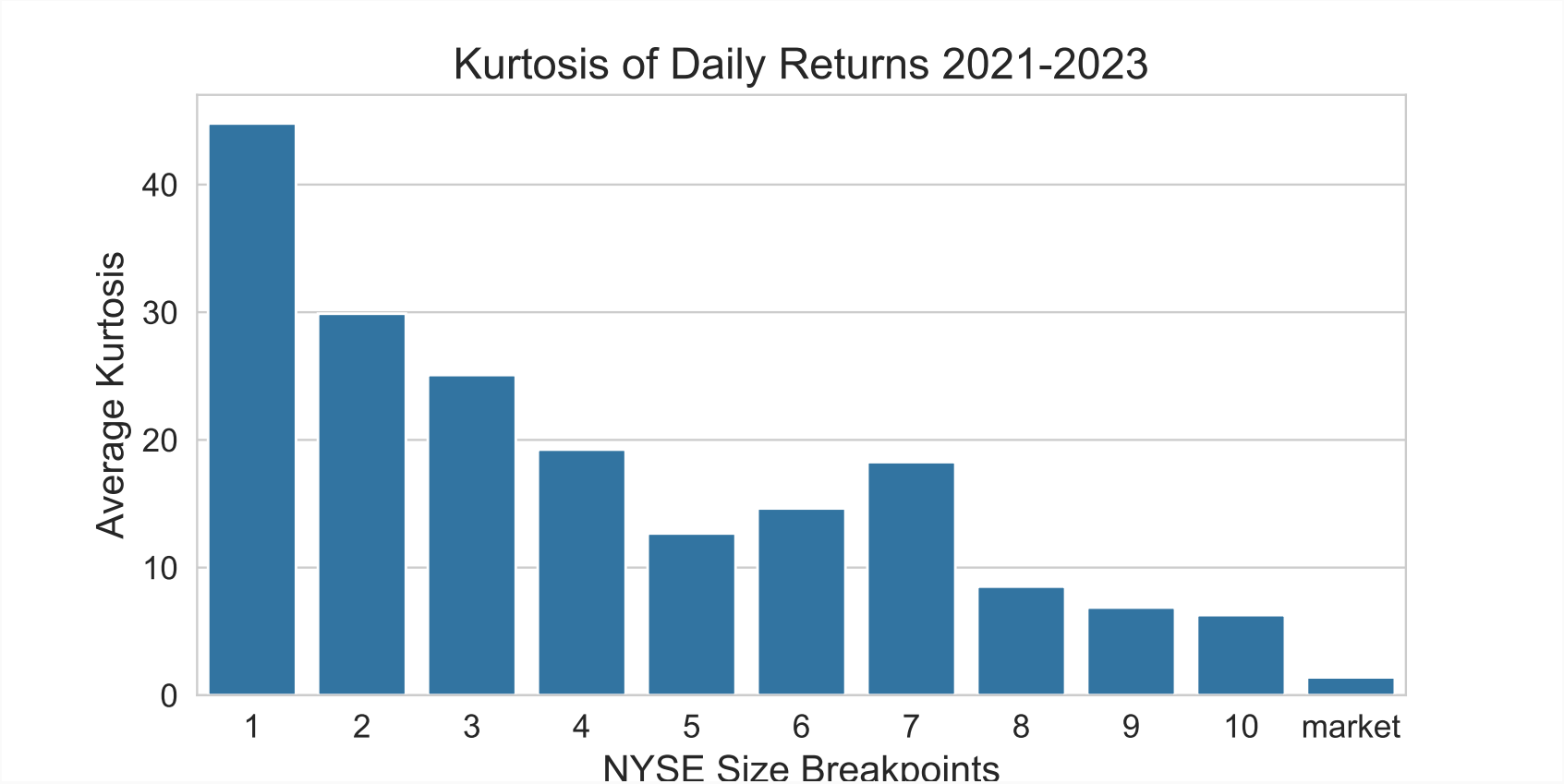
Skewness and Kurtosis

- Daily stock returns are generally positively skewed (the market is slightly negatively skewed)
- Daily stock returns have much higher kurtosis than the market
- Especially small caps

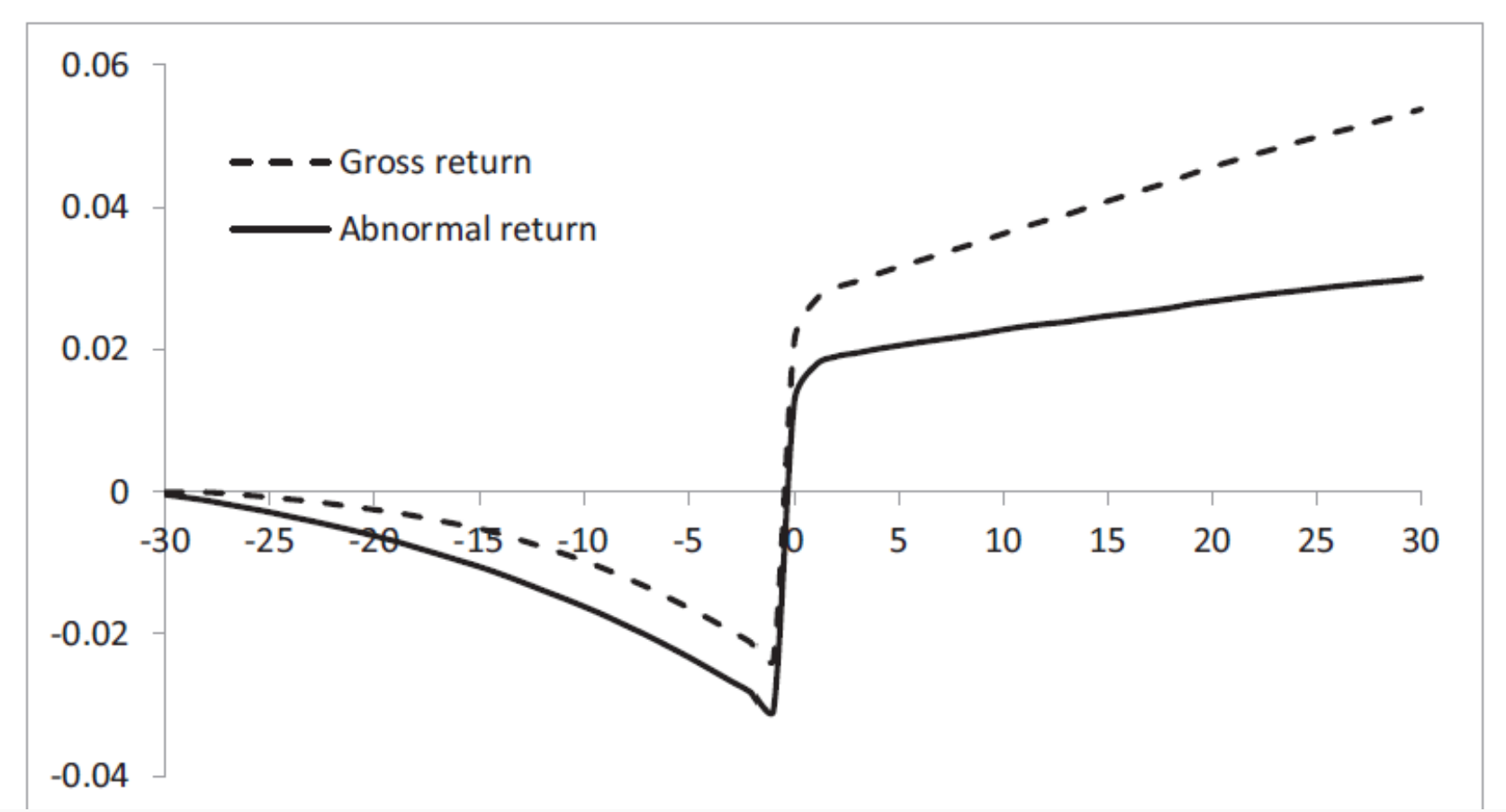
Skewness of Daily Returns



Kurtosis of Daily Returns



Returns Around Outlier Returns



Kapadia-Zekhnini (JFE, 2019) - 30 days before and after $\pm$ 3 sigma returns. Most outlier returns are on announcement days.

An Explanation: No News is Bad News

- Firms concerned about short-term stock price may delay the announcement of bad news.
- If the market thinks a firm may have news, each day that passes increases the likelihood that the news is bad, and the market reacts accordingly.
- Even bad news can look relatively good once expectations have fallen sufficiently $\rightarrow$ positive jumps.
- Positive mean jumps in our model $=$ good news $+$ risk premium.

Literature

- Static voluntary disclosure
  - Grossman (1981), Milgrom (1981)- unraveling
  - Dye (1985), Jung & Kwon (1988) - possibly uninformed
  - Dye & Hughes (2017) - risk-averse investors (nondisclosure increases variance)
- Dynamic voluntary disclosure
  - Acharya, DeMarzo & Kremer (2011) - single firm, exogenous announcement, risk neutrality (bad news $\rightarrow$ disclosure moved up)

Our Contributions

- Solve the model
- Multiple (two) firms
- Describe risk premia
- Confirm some model predictions using earnings announcements.

Overview

Main Mechanism of Model

- Firms delay announcements more than otherwise in hope that other firms will announce good news, on which they can free ride.
- Optimal exercise boundary like American put (disclose when price drops low enough)
- Equilibrium boundary: optimal boundary for one firm depends on disclosure policies of other firms
- Delay $\Rightarrow$ negative inferences $\Rightarrow$ falling price. Eventually, the boundary is reached.
- Delay also $\Rightarrow$ risk premia rise. Risk premia drop on announcement, and then rise again.

Announcement Returns

- Announcement returns are never negative.
- This is due to firms having complete discretion over timing. In reality, there are forces that reduce discretion.
- One way to generate some negative returns is to have some firms with zero discretion.

Model

- Time interval $[0, 1]$
- Two firms, each learns its value $\tilde{x}_i$ at a uniformly distributed random time $\tilde{\theta}_i$ (times are independent)
- Values $\tilde{x}_i$ are symmetric normal with correlation $\rho \geq 0$.
- Firms choose disclosure dates. Disclosures are discretionary but must be truthful.
- Constant risk-free rate (set $= 0$).

Pricing

- Representative CARA investor who consumes $\tilde{w}$ at date 1
- $(\tilde{x}_1, \tilde{x}_2, \tilde{w})$ are joint normal and symmetric in $\tilde{x}_1$ and $\tilde{x}_2$.
- SDF $\propto$ marginal utility
- Mostly work under risk-neutral probability
- Prices are risk-neutral expectations $\mathsf{E}_t^*[\tilde{x}_i]$ conditional on disclosures/non-disclosures and $= \tilde{x}_i$ after disclosures.
- Risk-neutral distribution is normal with same variances and correlation but different means $\mu^* < \mu$.

Firms' Objectives

- Assume firms care about short-run prices.
- Assume firms maximize the risk-neutral expectation of the average price between $t = 0$ and $t = 1$:

$$\mathsf{E}^* \int_0^1 P_{it} \, \mathrm{d}t \, .$$

Equilibrium

- Perfect Bayes
- Market is Bayesian
- Firms decisions are optimal from each t on, given market pricing and other firm's strategy.
- No off-equilibrium events except early disclosures.

Versions of the Model

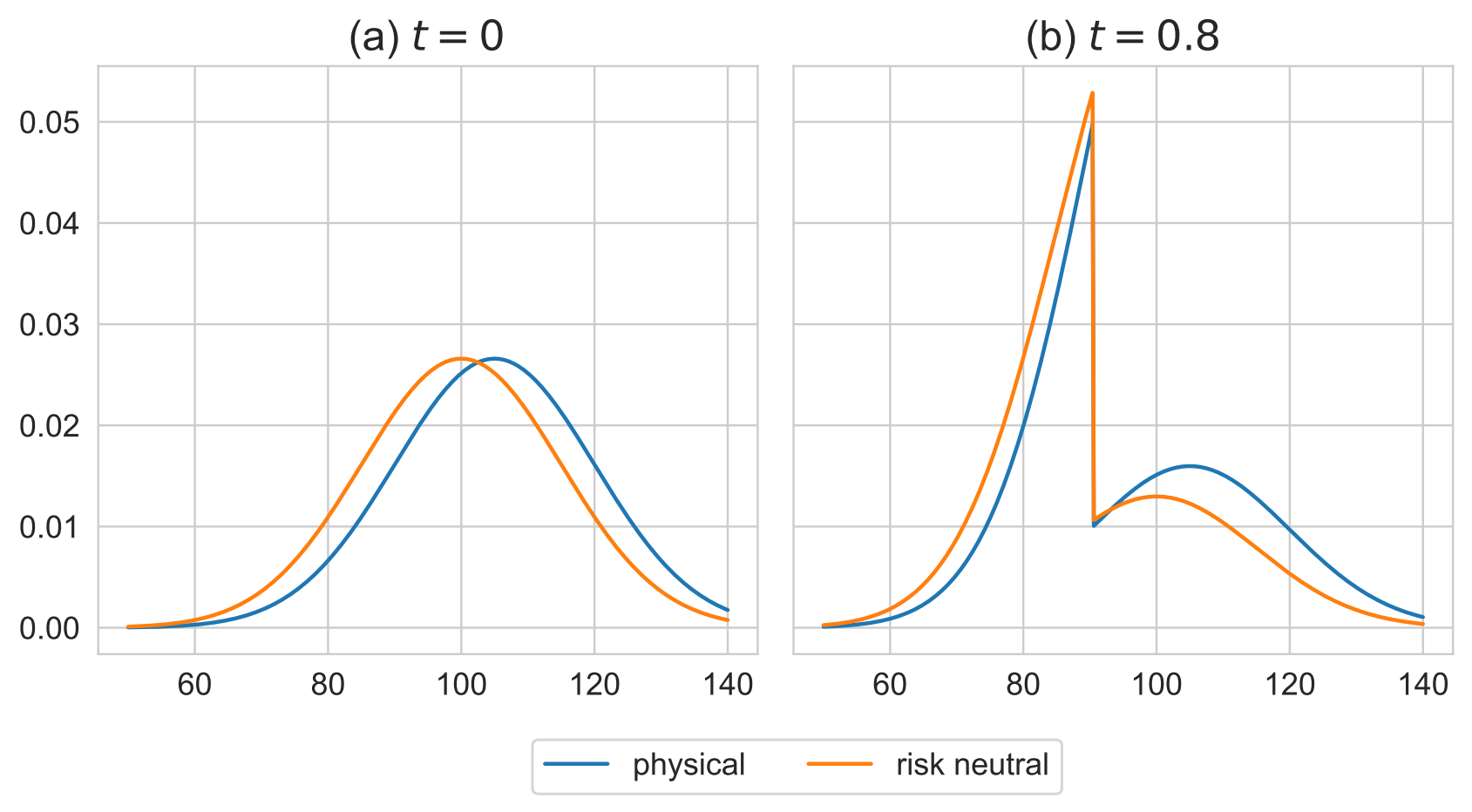
1. Firm 2 is uninformed until time $t = 1$.
2. Firm 2 is nonstrategic – discloses when it gets information
3. Both firms are strategic – choose optimal disclosure times

Model 1: Firm 2 is Uninformed

- Price decreases over time due to increasingly unfavorable inferences.
- Firm 1 discloses when price falls to its value (or when it learns its value, if that is later).
- Firm 2's price is $\rho \times$ Firm 1's price $+ (1 - \rho) \times$ unconditional mean.
- Equilibrium price P_t is the cutoff for disclosure in static model with probability t of being informed.

$$P_t = \mathrm{E}_t^*[\tilde{x} \mid \tilde{x} < P_t] \times \frac{t \times \mathrm{prob}(\tilde{x} < P_t)}{t \times \mathrm{prob}(\tilde{x} < P_t) + 1 - t} + \mathrm{E}_t^*[\tilde{x}] \times \frac{1 - t}{t \times \mathrm{prob}(\tilde{x} < P_t) + 1 - t}$$

Densities Conditional on No Disclosure



Probability of Withholding Negative News

- Physical probability: $\tilde{x} = \mu + \sigma\tilde{\varepsilon}$ with $\tilde{\varepsilon}$ standard normal.

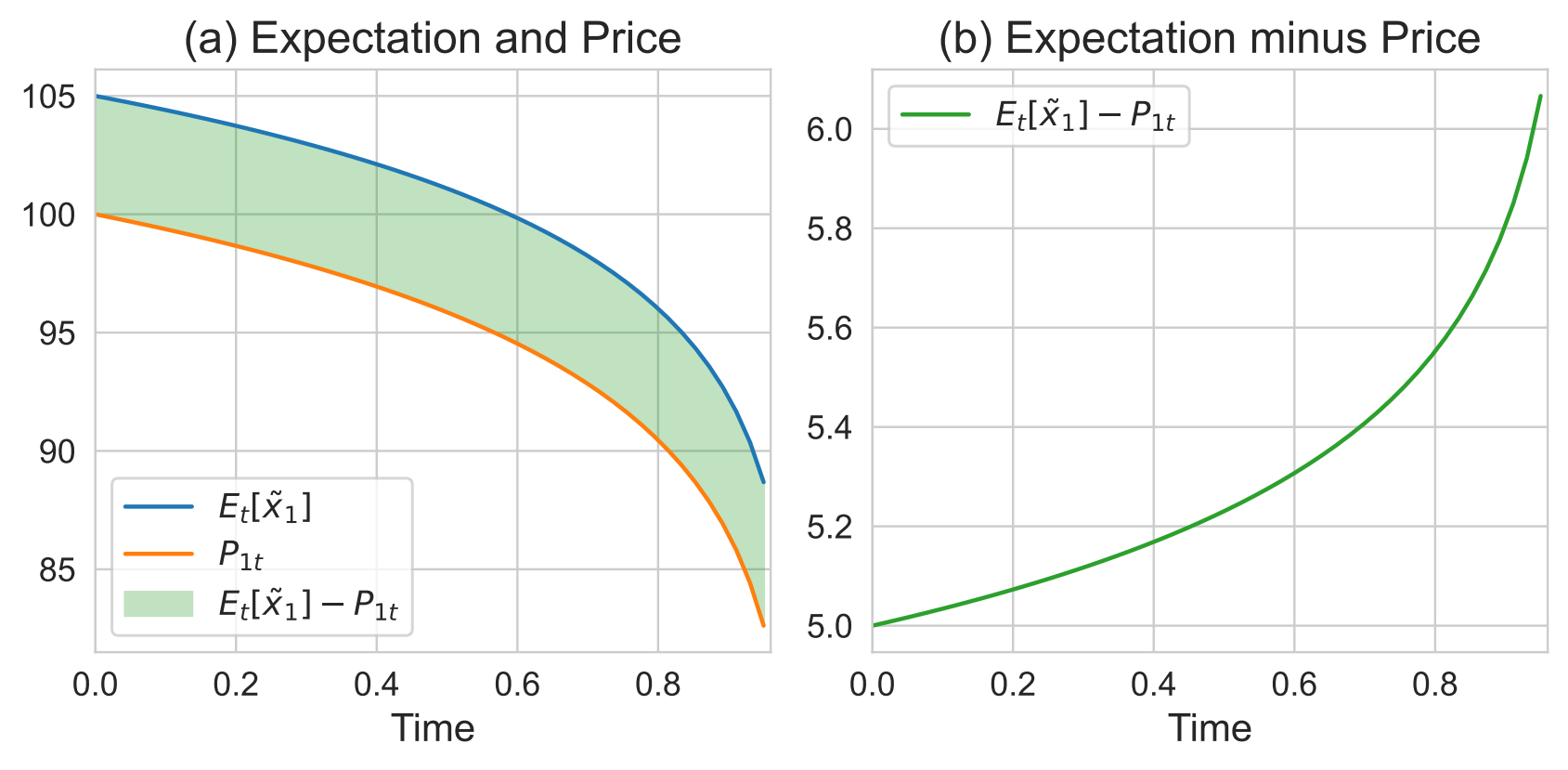
$$\text{prob}(\tilde{x} < P_t) = \Phi\left(\frac{P_t - \mu}{\sigma}\right)$$

- Risk-neutral probability: $\tilde{x} = \mu^* + \sigma\tilde{\varepsilon}$ with $\tilde{\varepsilon}$ standard normal.

$$\text{prob}^*(\tilde{x} < P_t) = \Phi\left(\frac{P_t - \mu^*}{\sigma}\right)$$

- Example: $\mu = 105$, $\mu^* = 100$, $P_t = 90$, $\sigma = 15$.
  - Physical probability $= \Phi(-1) = 0.16$
  - Risk neutral probability $= \Phi(-0.67) = 0.25$

Rising Risk Premium



Risk premium $\mathrm{E}[\tilde{x}] - P = \mathrm{E}[\tilde{x}] - \mathrm{E}^*[\tilde{x}]$ is higher for higher t.

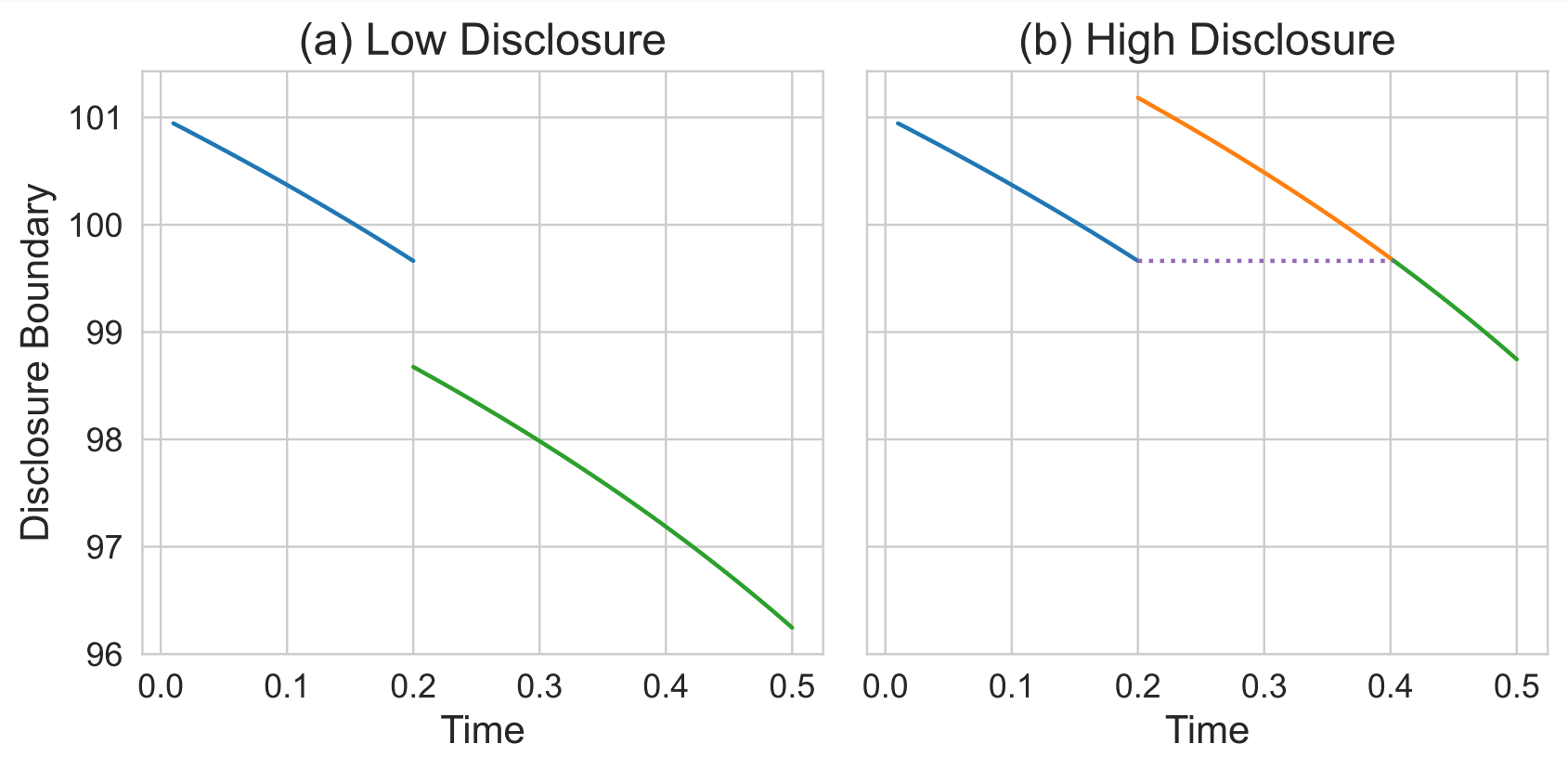
Model 2. Firm 2 is Nonstrategic

- Now there is a value to keeping option alive – nonstrategic firm may announce good news.
- Like ADK but random exogenous announcement time.
- Need to find optimal disclosure boundary B_t. Disclose if $\tilde{x} \geq B_t$.
- Option must be sufficiently far in the money before exercise is optimal.
  - Option is at the money when $P_t = \tilde{x}$.
  - Must have $P_t < \tilde{x}$ before exercise is optimal $\Leftrightarrow \ P_t < B_t$.

Equilibrium Condition

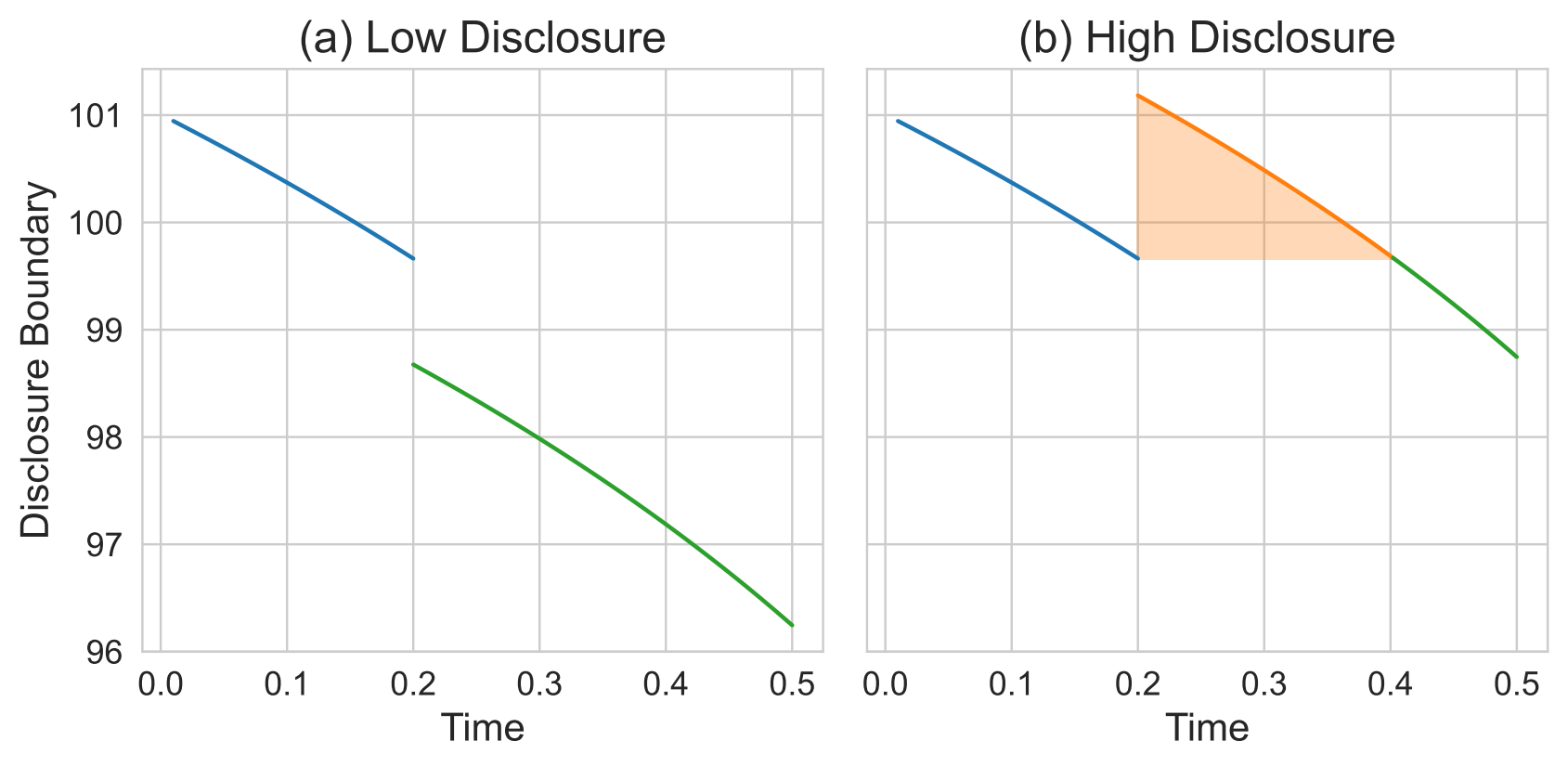
- A firm with value $\tilde{x} = B_t$ must be indifferent between disclosing and not disclosing.
- The cost of not disclosing is the foregone price increase $B_t - P_t$.
- The benefit of not disclosing is the possibility of announcement by firm 2 that lifts firm 1's price.
- After firm 2 discloses, the boundary is $B_t = P_t$.

Types of Firm 2 Disclosures



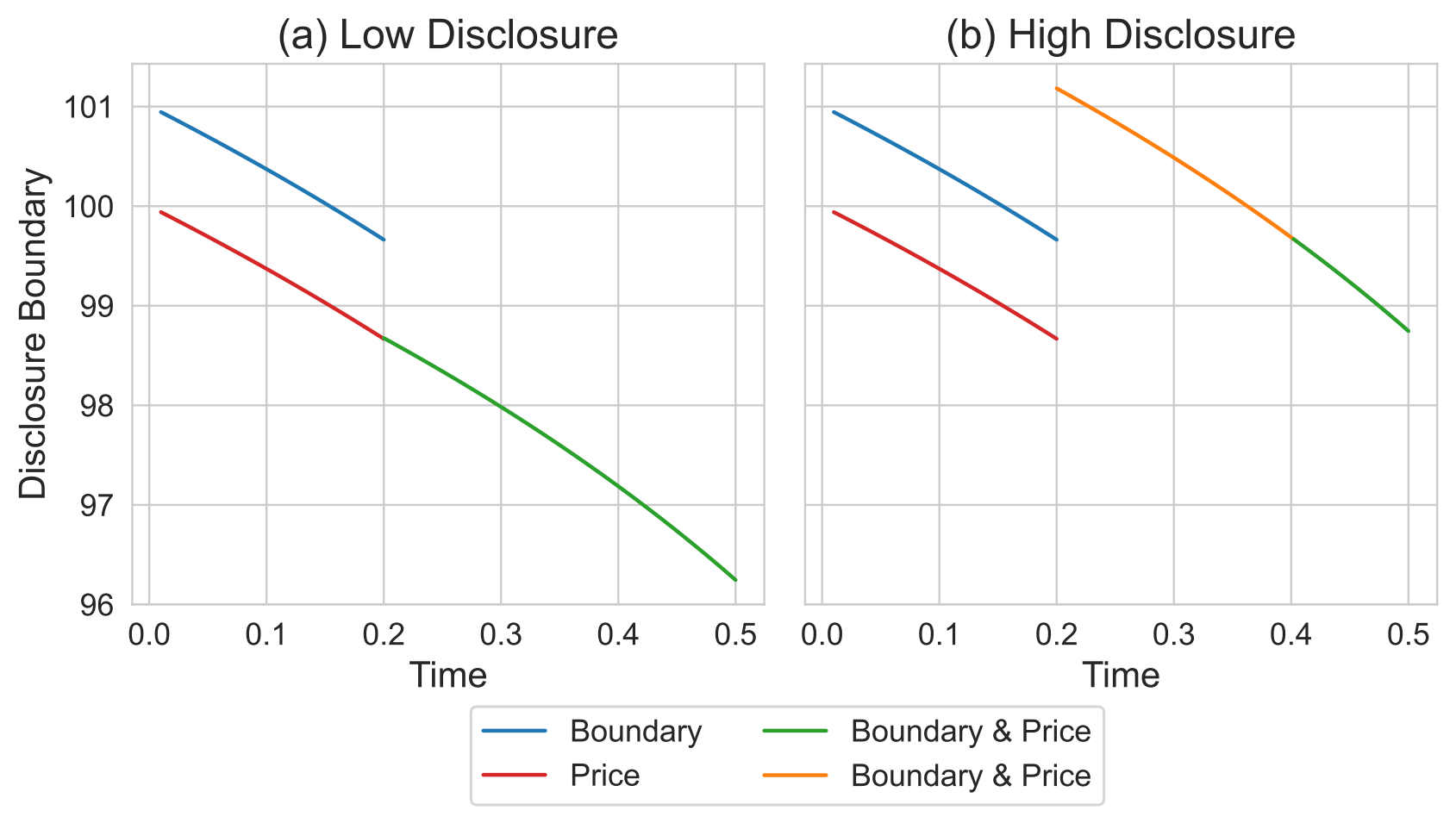
Assume firm 2 discloses first at $t = 0.2$. Post-disclosure equilibrium on left is same as single informed firm. Firm 1 disclosure happens faster on left.

Benefit of Waiting

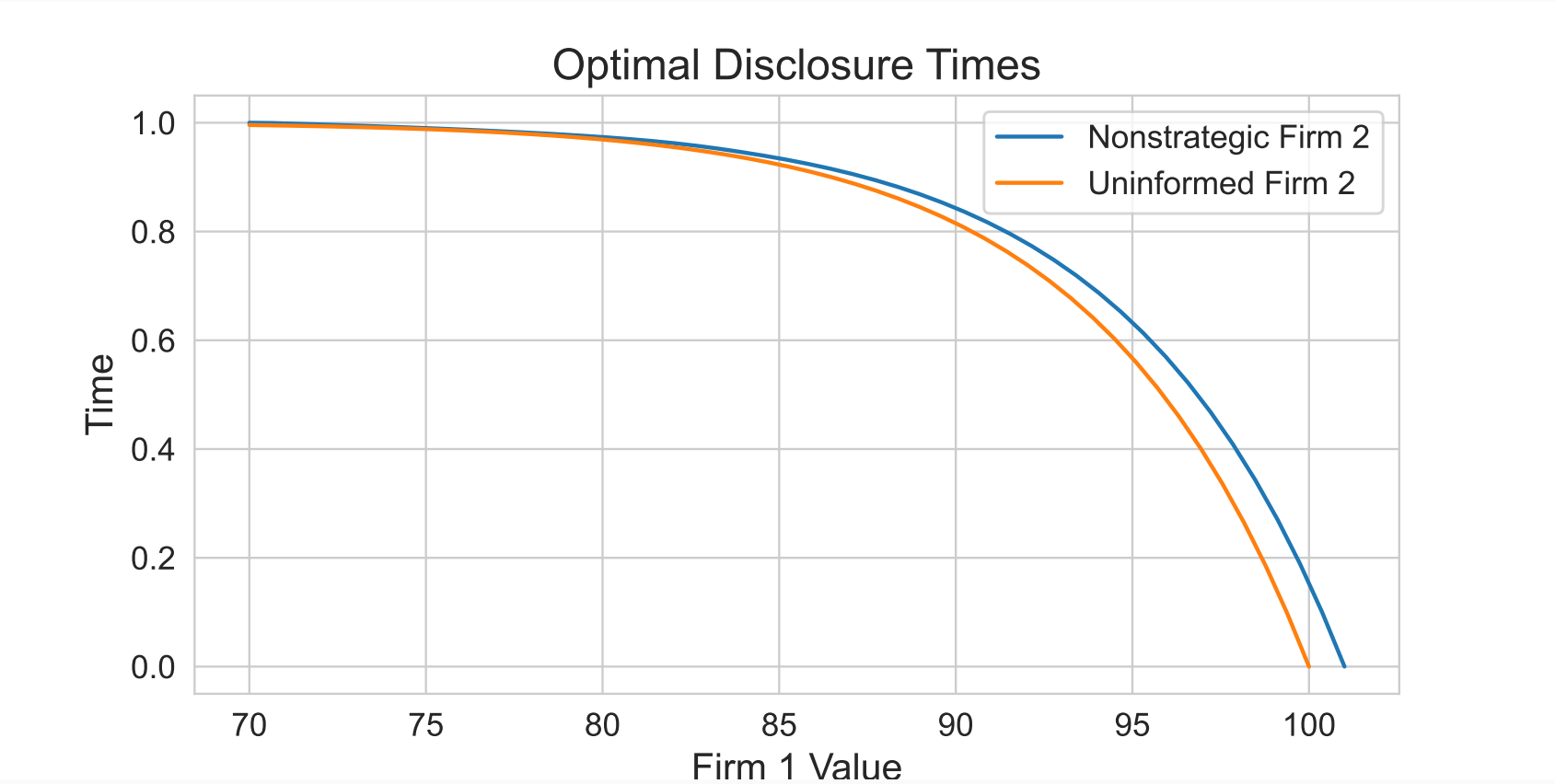


Expected benefit of waiting is area of "triangle" integrated over firm 2 disclosures, multiplied by arrival rate.

Full Equilibrium

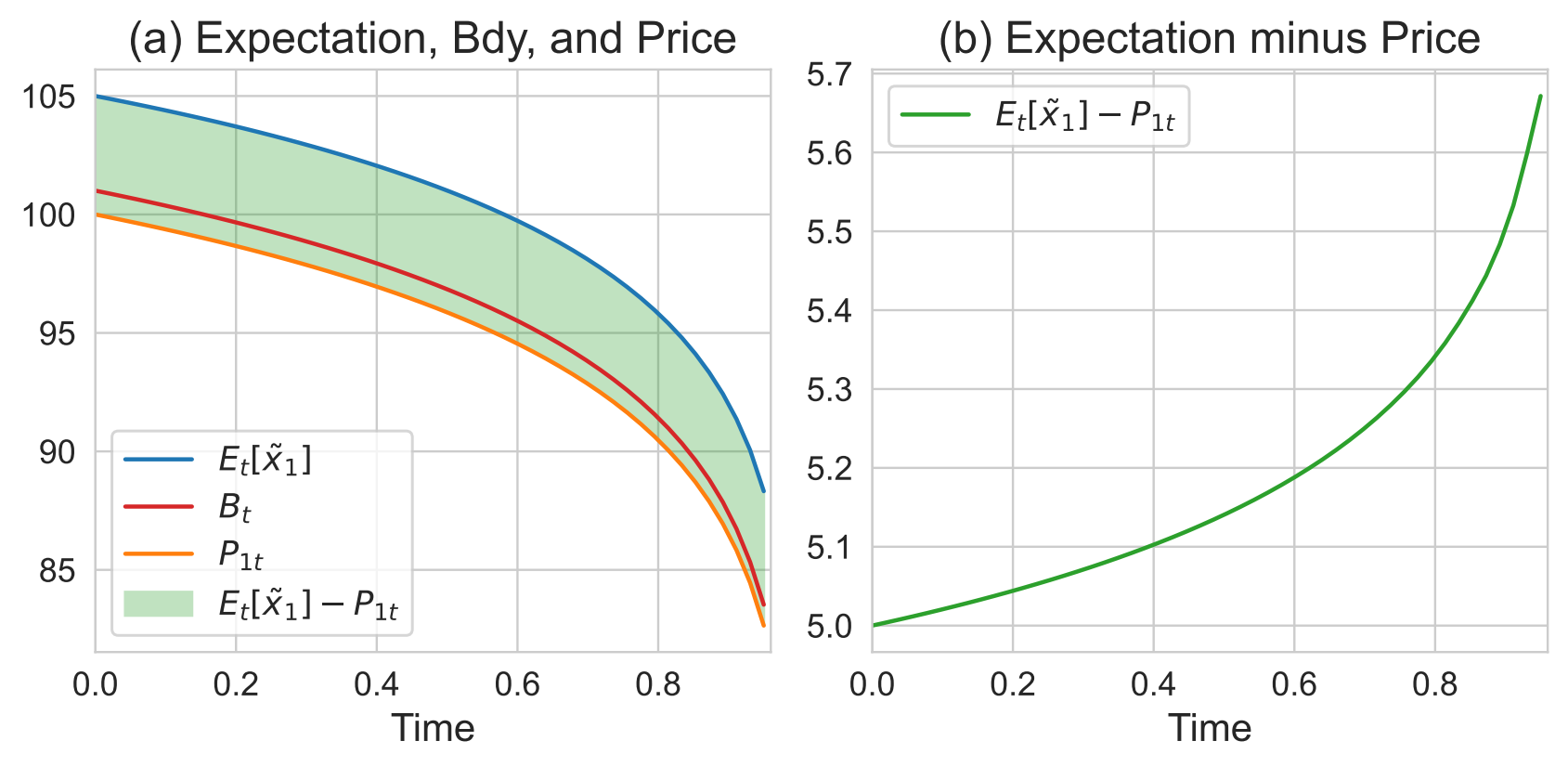


Option Value ⇒ More Delay



Assume firm 2 has not yet disclosed. Firm 1 delays disclosure more when there is a chance of firm 2 having good news.

Rising Risk Premium Again



Assume firm 2 has not yet disclosed. Risk premium $\mathrm{E}_t[\tilde{x}] - P_t = \mathrm{E}_t[\tilde{x}] - \mathrm{E}^*[\tilde{x}]$ is higher for higher t.

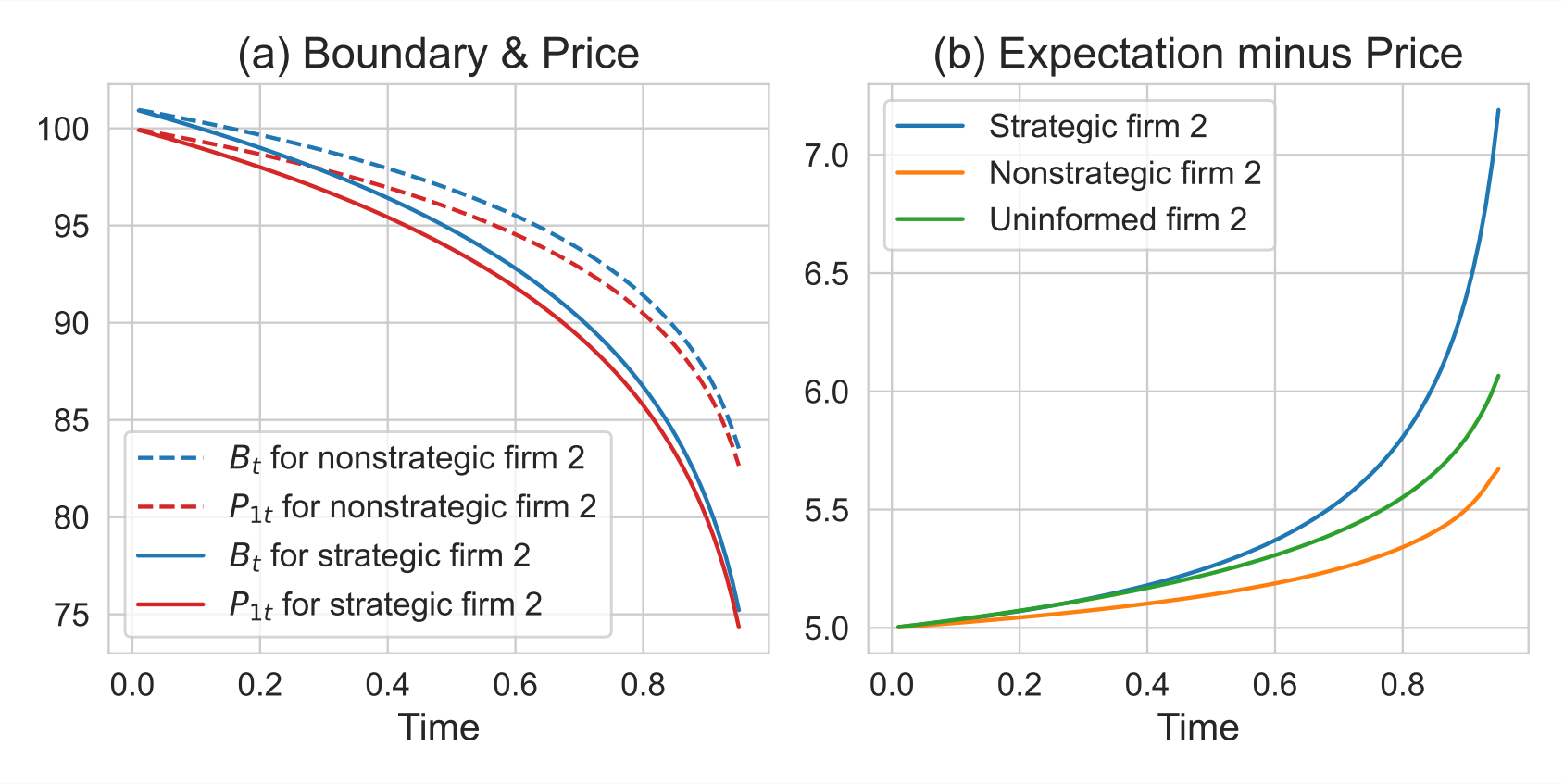
Model 3. Both Firms are Strategic

Equilibrium Calculation

- Now two reasons firm 2 might disclose:
  1. Just learned its value, which is above boundary.
  2. Knew its value, and boundary has fallen to it.
- Can prove no benefit of waiting for type 2 disclosures.
- Given that, equilibrium calculation is just more complicated version of Model 2 (more things to condition on).

Inferences from Nondisclosure

- Model 2 versus model 1:
  - market anticipates more delay in model 2
  - $\Rightarrow$ less extreme inferences from nondisclosure
  - $\Rightarrow$ risk premia rise more slowly
- Model 3 versus model 2:
  - greater likelihood of some firm withholding negative news when there are more strategic firms
  - $\Rightarrow$ market makes more extreme inferences from nondisclosure
  - $\Rightarrow$ risk premia rise more quickly

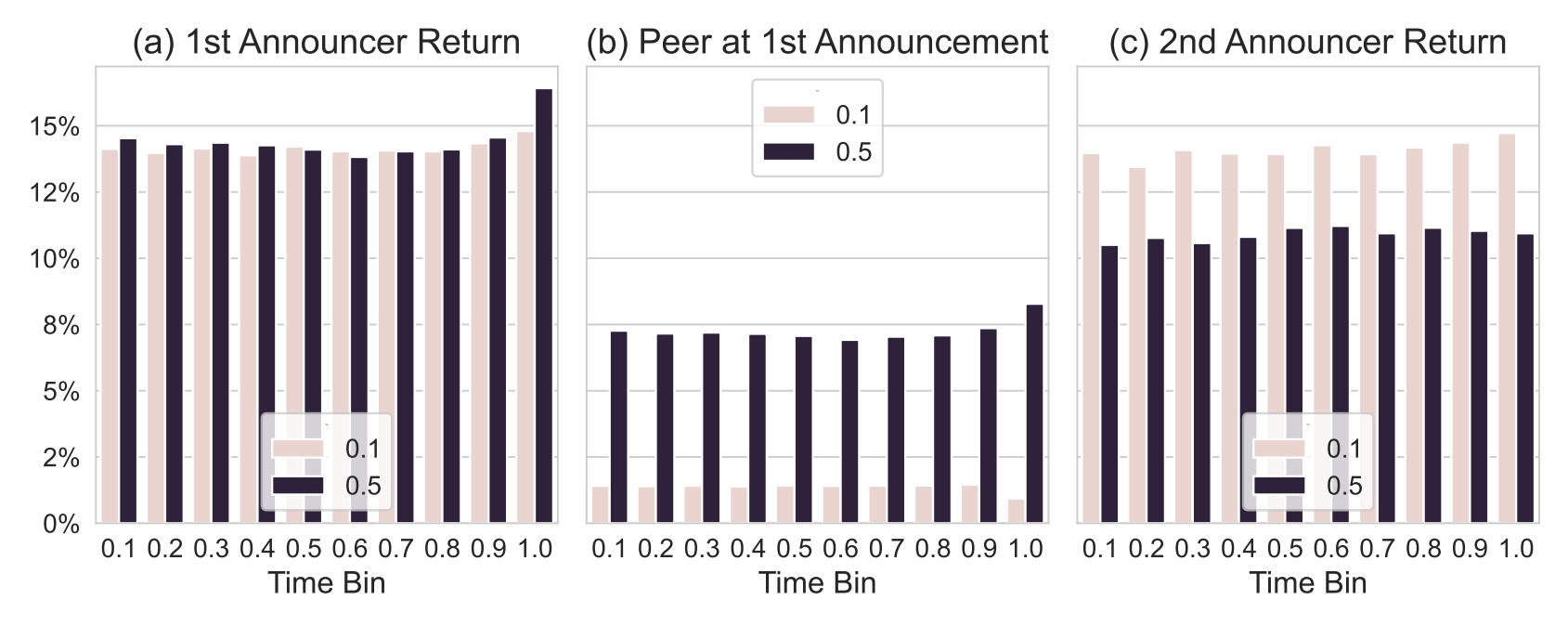


Boundaries, prices, and risk premia prior to disclosures.

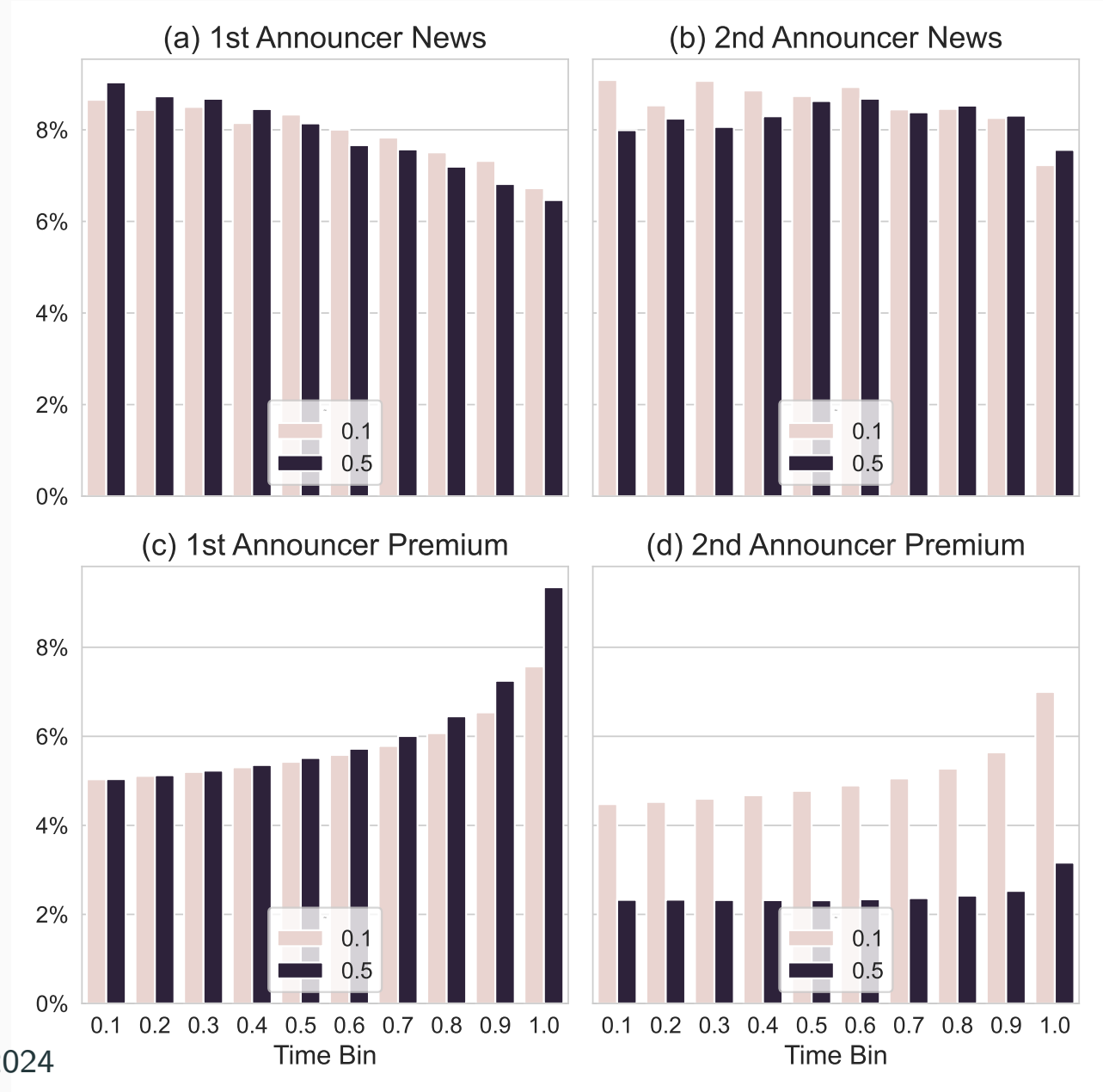
Announcement Returns and Risk Premia

- We simulate 100,000 paths of the model with $\mu = 105$, $= 100$, $\sigma = 15$, and $\rho \in \{0.1, 0.5\}$.
- Collect announcement dates and announcement returns.
- Announcement return $= \tilde{x}/P_t - 1$
  - News return $= \tilde{x}/\mathsf{E}_t[\tilde{x}] - 1$
  - Risk premium $= \mathsf{E}_t[\tilde{x}]/P_t - 1$
  - Announcement return $= (1 + \text{news})(1 + \text{premium}) - 1$

Total Returns by Time Bin



News Returns and Risk Premia



Empirics

Summary of Empirics (Earnings Announcements)

- Look at changes in announcement dates relative to
  - Previous year's date
  - Forecast of date by Wall Street Horizons
- Higher peer and aggregate announcement returns pre disclosure $\Rightarrow$ delayed disclosure

Empirical Literature

- DeHaan, Shevlin & Thornock (2015) - firms announce bad earnings news on Friday afternoons
- Johnson & So (2018) - using same Wall Streets Horizons data that we use, show firms delay earnings announcements when news is bad
- We look at strategic timing based on peer announcements rather than a firm's own news.
- Strategic timing of other announcements: Tse and Tucker (2010), Sletten (2012), Aragon and Nanda (2017), ...

Earnings Announcements

- Good setting to study our model, because:
  - Peer firms announce in well-defined period
  - Ex ante measures of when firms are expected to announce
- Bad setting to study our model, because:
  - Repeated game: commitment to a predictable strategy may be an equilibrium of a repeated game
  - Advance scheduling reduces scope for strategic timing

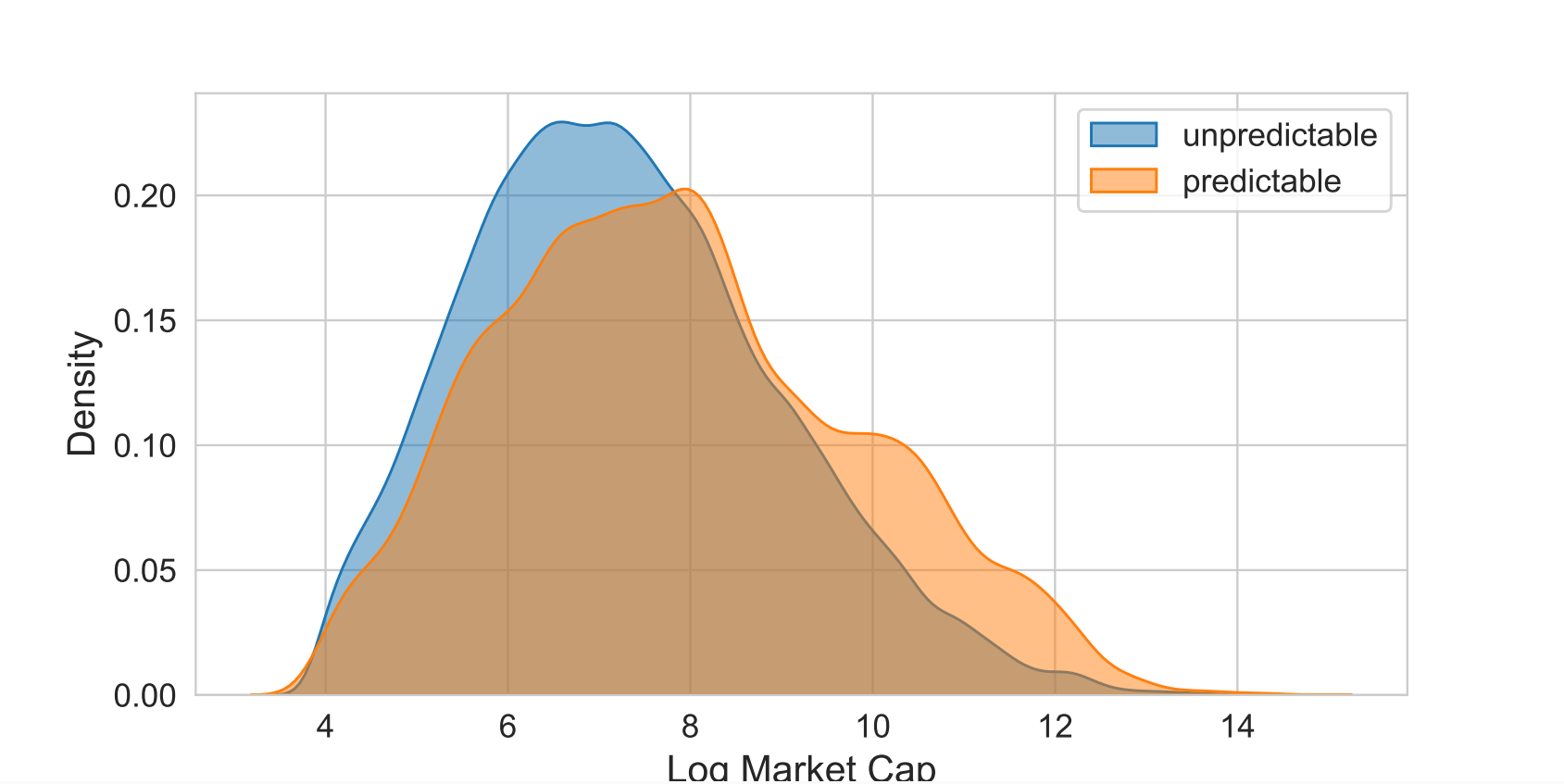
Anticipated Announcement Dates

- date 4 quarters earlier $\rightarrow$ year-on-year changes
- Wall Street Horizons forecast $\rightarrow$ WSH forecast errors
- 5,300 firms and 147,000 announcements

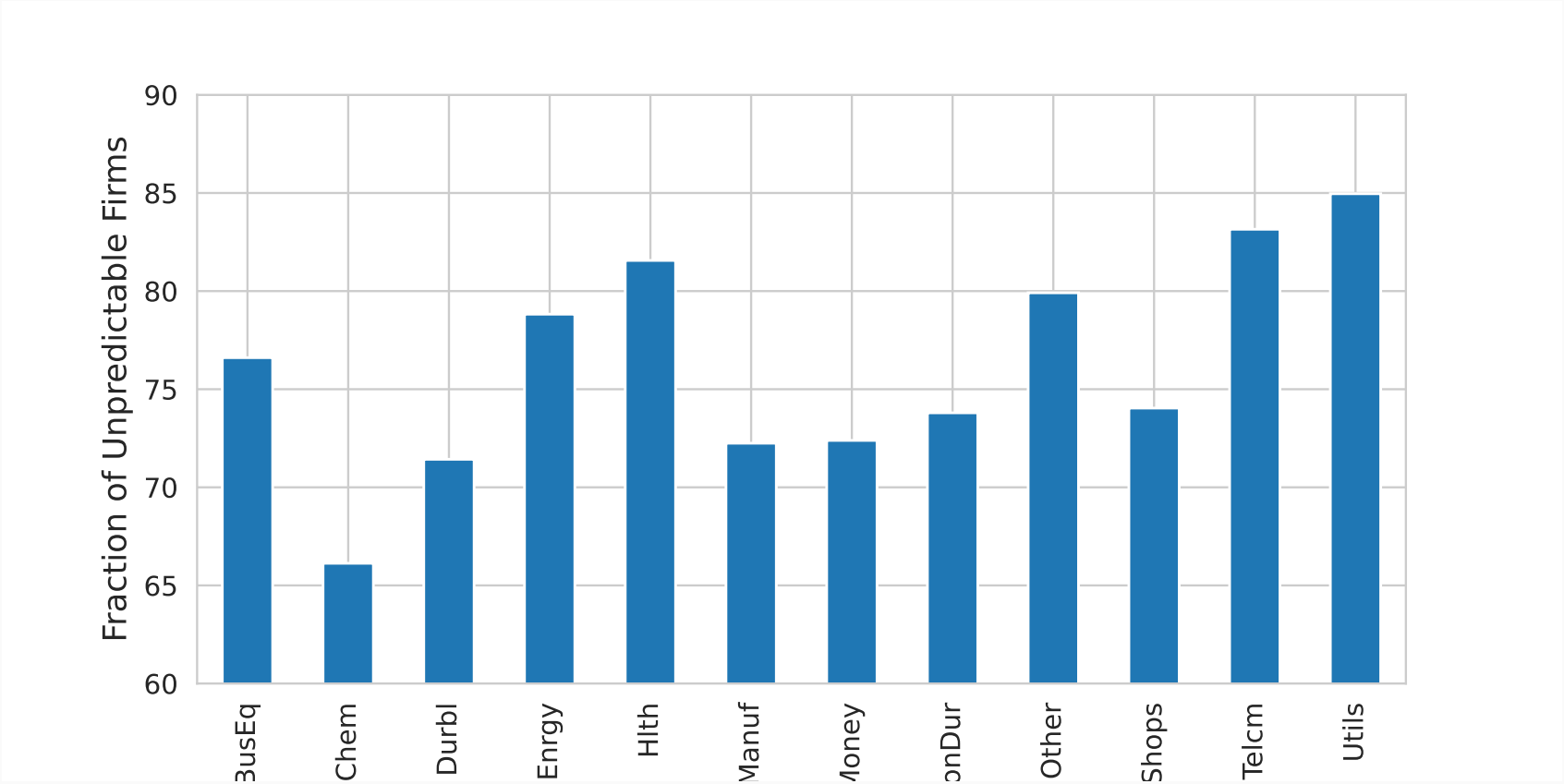
Exclude Predictable Firms

- WSH exactly correct more than 50% of the time, or
- announce on the same day of the week more than 90% of the time
- 4,000 firms and 115,000 announcements

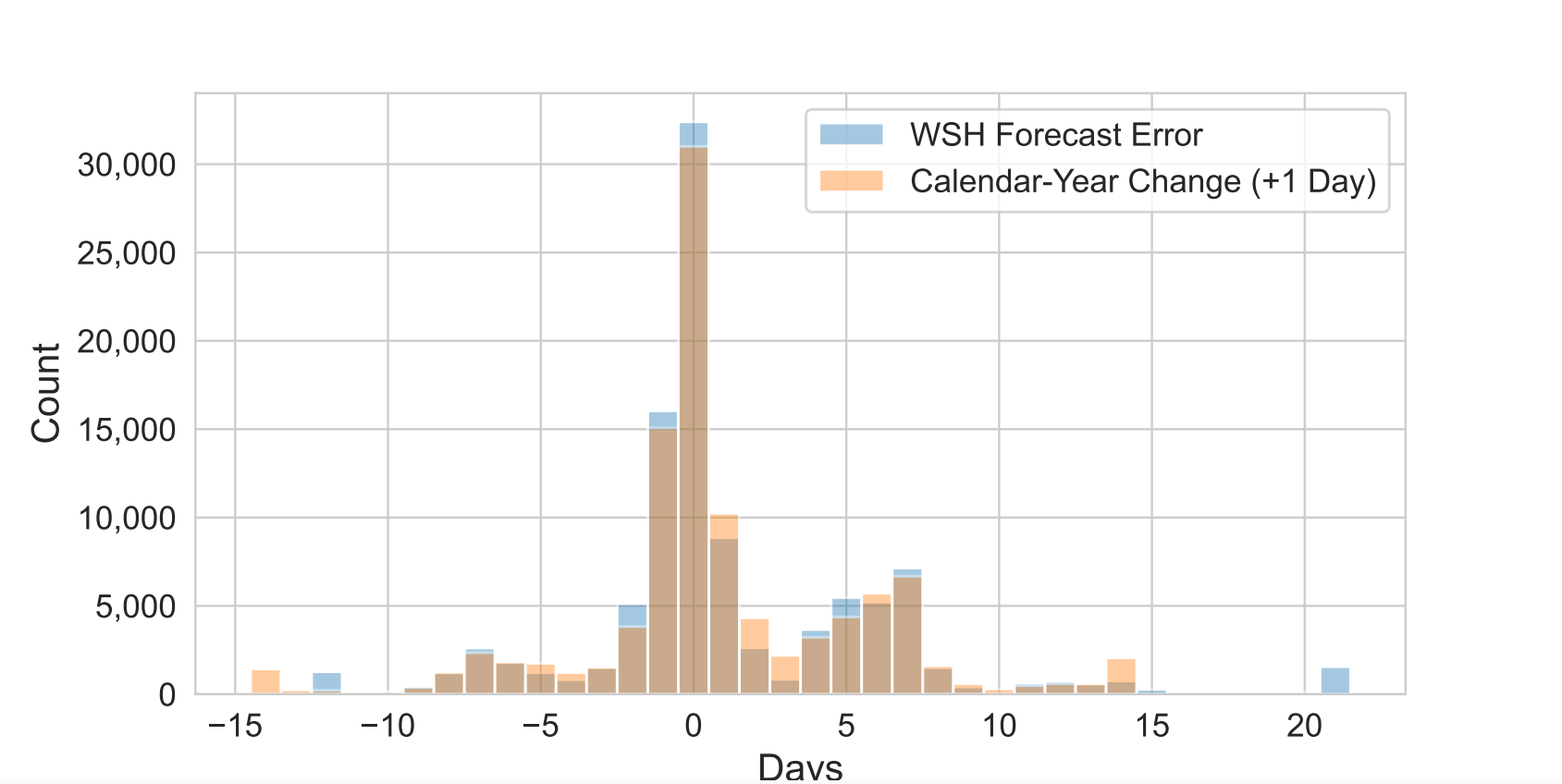
Market Caps of Retained and Excluded Firms



Industry Distribution of Retained Firms



Announcement Date Shifts for Retained Firms



Main Hypothesis

- Firms delay announcements when peers announce good news
- Firms move announcements up when peers announce bad news
- Uber & Lyft: from WSJ, May 4, 2022

  Lyft's commentary was so bad, Uber Technologies moved up its earnings release and conference call after watching its own shares trade off sharply in sympathy.

Windows for Peer Announcements

- Announcements early, on-time, or late
- Look at peer announcement returns in window before announcement for early and on-time
- Look at peer announcement returns in window before anticipated date for late
- Three-day windows in all cases
- Windows are after announcement scheduling. Hypothesis is that firms anticipate peer announcement returns when scheduling.
  - Schedule early or on-time if anticipate bad peer news
  - Schedule late if anticipate good peer news

Regression of Forecast Errors on Peer Returns

	(1)	(2)	(3)	(4)	(5)	(6)
R^{FF12}	0.07***	0.07***			0.04**	
	(0.02)	(0.02)			(0.02)	
R^{GICS4}			0.05***	0.04*		0.03
			(0.02)	(0.02)		(0.02)
R^{agg}					0.20**	0.19**
					(0.09)	(0.10)
Firm FE	Y	Y	Y	Y	Y	Y
Day FE	N	Y	N	Y	Y	Y
Num Obs	105,066	105,066	104,973	104,973	105,065	104,972

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Thanks!