Macroeconomic Announcements and the Repricing of Earnings Risk

Leyla Jianyu Han and Ella Patelli*

August 7, 2026

Abstract: Macroeconomic announcements trigger the repricing of previous firm-specific earnings news, generating cross-sectional heterogeneity in risk compensation. At earnings announcements, investors form joint beliefs about firm-specific fundamentals and aggregate conditions. Subsequent macroeconomic announcements reveal the aggregate state, leading investors to reassess the firm-specific component of prior earnings news. We quantify this repricing channel in a dynamic equilibrium model with learning across earnings and macroeconomic announcements. Empirical evidence supports the model's predictions: on macroeconomic announcement days, firms with recent earnings news earn lower risk premia than those without, and this effect is stronger when their earnings are more informative about aggregate conditions.

Keywords: Learning, Information, Earnings Announcements, Macroeconomic Announcements, Cross Section

*Leyla Jianyu Han (leylahan@bu.edu) is at the Questrom School of Business, Boston University. Ella Patelli (ella.patelli@sauder.ubc.ca) is at the Sauder School of Business, University of British Columbia. We thank Hengjie Ai, Harjoat Bhamra (discussant), Kent Daniel (discussant), Burton Hollifield (discussant), Zhi Da, Jack Favilukis, Paul Fischer, Lorenzo Garlappi, Ken Kasa, Simone Lenzu, Victor Orestes, and Nick Roussanov for helpful comments. We also thank seminar participants at Boston University, the University of British Columbia, and the Federal Reserve Bank of Boston, as well as conference participants at the Texas Finance Festival, the Western Finance Association Annual Meeting, the UBC Winter Finance Conference, the UBC Summer Finance Conference, and the Early Career Women in Finance Conference at the WFA. We thank Siyang Liu for excellent research assistance. We gratefully acknowledge financial support from the Social Sciences and Humanities Research Council of Canada (SSHRC Insight Grant 2026).

1 Introduction

It is well documented that macroeconomic announcements convey news about the aggregate economy and are associated with large realizations of the equity market risk premium. The existing literature has emphasized *positive* fundamental comovement on these days: favorable macroeconomic news raises the valuations of all firms, while unfavorable news lowers them (Savor and Wilson, 2014; Ai and Bansal, 2018). In this paper, we provide both theoretical and empirical evidence for a distinct *negative* comovement mechanism: the repricing channel of macroeconomic announcements. This channel arises from the interaction between macroeconomic announcements and previously released earnings news. We show that this mechanism is quantitatively important and generates substantial cross-sectional heterogeneity in returns on macroeconomic announcement days.

Firm earnings announcements convey a mixture of information about aggregate economic conditions and firm-specific fundamentals (Savor and Wilson, 2016), and disentangling these components is difficult. Subsequent macroeconomic announcements help investors separate them by revealing the aggregate state of the economy. Rational investors therefore update not only their beliefs about aggregate conditions but also their assessment of the firm-specific fundamentals embedded in prior earnings news. Stronger-than-expected macroeconomic news leads investors to attribute more of the firm's earlier earnings strength to favorable aggregate conditions and correspondingly less to the firm itself; weaker-than-expected news implies the reverse. Consequently, a rational capital market must reprice the firm-specific component of prior earnings news, even without direct information about individual firms. The induced negative comovement between aggregate and firm-specific belief updates dampens the firm's return covariance with the market (its risk exposure) and thereby lowers its risk premium on macroeconomic announcement days. Consistent with this mechanism, we show that firms that recently announced earnings underperform otherwise similar firms on macroeconomic announcement days by 20 basis points (bps) per day (6% annualized) in equal-weighted portfolios and by 9 bps per day (3% annualized) in value-weighted portfolios.

We first formalize this repricing mechanism in a dynamic general equilibrium model with Bayesian learning from earnings and macroeconomic announcements. Both expected firm-specific cash flow growth (g) and expected aggregate cash flow growth (θ) are unobservable, so investors

must form beliefs based on public information. We assume a cross section of firms announces earnings simultaneously at prescheduled dates. Each firm's earnings announcement is a noisy signal of the sum of aggregate and firm-specific cash flow growth, $\theta + g$. Investors therefore use earnings announcements to jointly update their beliefs about both aggregate and firm-specific fundamentals in the same direction: any earnings news is partly about the firm and partly about the economy.

Immediately after the earnings announcements, a scheduled macroeconomic announcement fully reveals the aggregate state θ. Because the earlier earnings signal conveyed information about the sum $\theta + g$, a positive surprise in θ mechanically triggers a negative revision in firm-specific g, and vice versa. The resulting revision in g generates a repricing component of the firm's return that covaries negatively with the market return, which is driven solely by beliefs about θ in the model. This negative covariance attenuates the firm's total return covariance with the market and hence lowers its announcement-day beta. The lower beta in turn implies a lower risk premium relative to firms without recent earnings news. We refer to this negative contribution to expected returns as the *repricing premium*.

Our model further predicts cross-sectional heterogeneity in this repricing effect. Firms whose earnings announcements are more informative about aggregate conditions exhibit higher earnings announcement betas and experience stronger repricing on macroeconomic announcement days. In the model, earnings signal precision is heterogeneous across firms. More informative earnings news leads to higher earnings announcement betas because precise signals resolve more uncertainty and thereby induce stronger joint revisions in aggregate and firm-specific expectations in the same direction. However, this same precision amplifies repricing when macroeconomic news arrives. Because informative earnings signals tightly identify the sum $\theta+g$, a surprise in θ forces a nearly one-for-one opposite revision in g, generating a more negative covariance and a more negative repricing premium. In contrast, when earnings signals are noisy, the link between aggregate and firm-specific components is weak, and repricing is muted. As a result, cross-sectional variation in earnings announcement betas generates predictable cross-sectional variation in returns on macroeconomic announcement days.

We empirically test the economic mechanism of the repricing channel by examining four predic-

tions of the model using high-frequency U.S. equity data from 1994 to 2024.[1] Our first prediction is that firms with recent earnings announcements earn lower expected returns on macroeconomic announcement days than firms without recent news. Empirically, we classify firms into "recent announcers" (those that reported earnings within the 15 trading days preceding a macroeconomic announcement) and "non-announcers" (those without recent earnings news), and compare their average returns on macroeconomic announcement days. This return spread captures the repricing premium, as the repricing mechanism lowers the returns of recent announcers but is absent for non-announcers. Consistent with the theory, recent announcers systematically underperform non-announcers when macroeconomic news is released. Because each firm's return on a macroeconomic announcement day reflects both its unconditional market exposure and the offsetting risk exposure induced by repricing, we construct CAPM-neutral returns by subtracting the return associated with each firm's unconditional CAPM beta. A long-short portfolio that is long non-announcers and short recent announcers, matched on industry and size, earns CAPM-neutral returns of approximately 6 to 7 bps per macroeconomic announcement day.

The second prediction of our model concerns cross-sectional heterogeneity among recent announcers. Firms whose earnings announcements are more informative about aggregate conditions should exhibit higher earnings announcement betas but lower betas and returns on subsequent macroeconomic announcement days. To test this implication, we extend the approach of Patton and Verardo (2012) and estimate market betas using high-frequency intraday returns. We measure the informativeness of earnings announcements using an earnings-day excess beta, defined as a stock's intraday beta on its earnings announcement day in excess of its unconditional CAPM beta. This excess beta captures the incremental information embedded in the announcement. The macro-day excess beta is defined analogously. On the day before each macroeconomic announcement, we sort recent announcers into portfolios based on their earnings-day excess betas. Consistent with the model, we find a strong monotonic pattern: firms in the highest earnings-day excess beta quintile (most informative earnings announcements) earn substantially lower CAPM-neutral returns on the subsequent macroeconomic announcement day than firms in the lowest quintile, and their macro-

[1] Following Ai and Bansal (2018), we focus on four major macroeconomic releases: FOMC, GDP, Nonfarm Payroll Employment, and the ISM Manufacturing Index.

day excess betas are correspondingly lower. A long-short strategy that is long low-informativeness announcers and short high-informativeness announcers earns economically large and statistically significant CAPM-neutral returns of 22 to 23 bps per macroeconomic announcement day.

Third, we show that the repricing effect depends critically on the timing of earnings announcements. Firms that announce earnings immediately before a macroeconomic announcement (recent announcers) earn substantially lower returns on macroeconomic announcement days than firms that announce immediately after ("distant announcers," as their earnings announcements are farthest from the next macroeconomic announcement). Within the model's information cycle, an earnings announcement released just after a macroeconomic announcement is not subject to repricing because the aggregate state is already known at the time of the earnings release. In contrast, firms announcing earnings just before a macroeconomic announcement are subject to repricing. The model therefore predicts lower returns on macroeconomic announcement days for recent announcers than for distant announcers. Consistent with this prediction, portfolios that are long distant announcers and short recent announcers, matched on industry and size, generate statistically significant CAPM-neutral returns of 9 to 15 bps per macroeconomic announcement day.

Finally, we provide direct evidence on the belief-revision channel using analyst earnings per share (EPS) forecast revisions around macroeconomic announcement days. Our model predicts that, for recent announcers, macroeconomic surprises move firm-specific expectations in the opposite direction: a positive macroeconomic surprise lowers expected firm cash flows, while a negative surprise raises them. A direct test must separate this repricing effect from fundamental comovement, as macroeconomic news can also shift expected cash flows for all firms in the same direction. Using firms without recent earnings announcements as a benchmark for this common response, we find that forecast revisions for recent announcers respond more negatively to standardized consensus macroeconomic forecast errors than those for non-announcers. This result is robust to using demeaned market returns as an alternative measure of macroeconomic surprises. We also document a substantial increase in analyst forecasting activity on macroeconomic announcement days, particularly for firms with recent earnings news.

Our model quantitatively accounts for the repricing channel. Calibrated to match standard

macroeconomic and asset-pricing moments, it replicates the key cross-sectional patterns we document: the systematic underperformance of recent announcers relative to non-announcers and the monotonic relation between the informativeness of earnings announcements and the subsequent repricing premium.

Related Literature First, our paper contributes to the literature on how macroeconomic news affects stock returns. A large body of work documents significant excess returns around macroeconomic announcement days, especially FOMC days. Key empirical contributions include Lucca and Moench (2015), Savor and Wilson (2013), Mueller, Tahbaz-Salehi, and Vedolin (2017), Cieslak, Morse, and Vissing-Jorgensen (2019), Hu, Pan, Wang, and Zhu (2022), and Boguth, Fisher, Grégoire, and Martineau (2023), whereas Ai and Bansal (2018) and Wachter and Zhu (2022) provide theoretical foundations. While most studies focus on aggregate equity returns, some examine cross-sectional effects. Most closely related, Savor and Wilson (2014) show that the CAPM holds especially well on macroeconomic announcement days: stocks with higher unconditional market betas are associated with higher average returns in the cross section. Hasler and Martineau (2024) similarly find a stronger beta-return relation in high expected return periods. In contrast, we use high-frequency intraday returns to measure excess beta, the component beyond the unconditional CAPM beta, which isolates the incremental information revealed at announcements. This excess beta uncovers a repricing channel that generates a negative incremental component of comovement on announcement days, offsetting the strong positive comovement documented by Savor and Wilson (2014). Our paper highlights the importance of high-frequency micro data for understanding the impact of macroeconomic announcements. Other work explores stock-level exposure to monetary policy surprises and documents cross-sectional FOMC announcement premia: Ai, Han, Pan, and Xu (2022) use option-implied variance; Ozdagli (2018) and Chava and Hsu (2020) examine financial constraints. Hsu, Mitra, Xu, and Zeng (2025) show that Fed information shifts analyst forecasts of firm fundamentals, especially for cyclical firms. Distinct from these studies, we analyze a broader set of macroeconomic announcements, not limited to FOMC, and highlight their interaction with earnings announcements through a repricing mechanism.

Second, our paper relates to the literature on the earnings announcement premium. A long

line of work documents that stocks earn high average returns around earnings announcements (e.g., Chari, Jagannathan, and Ofer (1988), Ball and Kothari (1991), Frazzini and Lamont (2007), Cohen, Dey, Lys, and Sunder (2007), Barber, De George, Lehavy, and Trueman (2013), Gao, Hu, and Zhang (2026)). Savor and Wilson (2016) link the announcement premium to aggregate risk by showing that scheduled earnings announcements contain not only firm-specific but also aggregate cash flow information, creating a signal-extraction problem: investors observe total earnings but must infer the aggregate component. This generates high conditional covariance between firm and market returns, producing a higher risk premium for announcing firms. Consistent with this mechanism, they show that a portfolio of announcing firms predicts future aggregate earnings growth. Patton and Verardo (2012) provide further evidence, showing that high-frequency betas rise substantially around earnings announcements, especially when the news is informative about other firms. Building on the insight of Savor and Wilson (2016) and employing the high-frequency beta approach of Patton and Verardo (2012), we show that the signal-extraction problem is resolved on macroeconomic announcement days, when purely aggregate cash flow information is revealed. Relatedly, Sammon (2025) shows that passive ownership reduces firm-specific information in prices before earnings announcements. Martineau (2022) documents that price discovery now occurs largely on the earnings announcement date. Unlike the earnings-focused literature, we emphasize that earnings and macroeconomic announcements contain distinct information, prompting investors to learn across announcements and generating cross-sectional variation in returns on macroeconomic announcement days.

Third, our paper broadly fits within the literature on learning and information spillovers. Ai, Croce, Diercks, and Li (2018) show that gradual learning about firms' exposures to long-run growth news shapes the cross section of expected returns. Croce, Marchuk, and Schlag (2023) document a leading premium: firms in leading industries earn higher average returns because their cash flows provide valuable resolution of uncertainty about the growth prospects of lagging industries. Whereas their mechanism operates through lead-lag relations, ours operates through sequential information resolution across earnings and macroeconomic announcements. Ben-Rephael, Carlin, Da, and Israelsen (2021) empirically confirm the Savor and Wilson (2016) mechanism by showing

that investors cross-learn from peer firms' scheduled earnings announcements, as announcing firms convey cash flow news about related firms and the aggregate economy.[2] Ferracuti and Lind (2026) demonstrate that investors extract more macroeconomic information from earnings announcements during periods of clustered releases. Bonsall, Bozanic, and Fischer (2013) further show that management earnings forecasts convey macroeconomic information and influence peer firms' returns, especially when the forecast is bundled with an earnings announcement. Our paper provides a theoretical framework for cross-learning from clustered earnings announcements, in which investors pool signals to extract aggregate cash flow information, and focuses on the implications of this learning for risk premia on macroeconomic announcement days.

The rest of the paper is organized as follows. Section 2 presents motivating empirical evidence of the repricing premium: firms that recently announced their earnings earn lower returns on macroeconomic announcement days than other firms. Section 3 develops a dynamic general equilibrium model featuring both earnings and macroeconomic announcements to formalize the repricing channel and establishes the theoretical link between the informativeness of earnings announcements and the repricing premium. Section 4 tests the model's cross-sectional implications in the data and presents quantitative results demonstrating that the model can reproduce the observed empirical patterns. Section 5 concludes.

2 Motivating Evidence

Before turning to the formal model, we present reduced-form evidence that motivates the repricing channel. We show that on macroeconomic announcement days, firms with recent earnings news earn significantly lower returns than otherwise similar firms without recent earnings announcements.

For each macroeconomic announcement, we sort firms into two groups on the previous trading day. Recent announcers are firms that released a scheduled earnings announcement within the prior five trading days, while non-announcers are firms with no recent earnings news. To ensure

[2]Related literature documents attention spikes on announcement days, consistent with our theory that investors extract signals from announcements (e.g., Drake, Roulstone, and Thornock (2012), Hirshleifer and Sheng (2022), Fisher, Martineau, and Sheng (2022)). See Peng and Xiong (2006) for a theory of limited attention allocated between market-level and firm-specific information.

comparability, we construct the non-announcer portfolio to match the industry, size, and unconditional CAPM beta decile composition of the recent announcer portfolio. We also exclude firms that announce earnings on the macroeconomic announcement day itself and require at least 25 announcing firms per event.

Table 1: Returns of Recent Announcers and Non-Announcers on Macro Days

	Data (EW)	Data (VW)
Non-Announcers (Long)	29.65	25.70
	(6.11)	(5.17)
Recent Announcers (Short)	9.52	16.30
	(2.04)	(3.58)
Long-short	**20.13**	**9.40**
	(7.96)	**(2.65)**

This table reports daily excess returns (in basis points) on macroeconomic announcement days for portfolios formed on the preceding trading day. The short portfolio (Recent Announcers) consists of firms that issued a scheduled earnings announcement within the prior five trading days. The long portfolio (Non-Announcers) consists of firms without recent earnings announcements, matched to recent announcers by size, industry, and unconditional CAPM beta decile. Equal-weighted (EW) and value-weighted (VW) returns are computed for each macroeconomic announcement day. The table reports time-series means with t-statistics in parentheses. The sample includes 957 macroeconomic announcement days over 1994–2024.

Table 1 reports equal-weighted (EW) and value-weighted (VW) daily excess returns for each portfolio on macroeconomic announcement days, along with the long-short spread. Non-announcers earn significantly higher returns than recent announcers on these days. The EW long-short spread—long non-announcers and short recent announcers—is 20.13 bps ($t = 7.96$) per macroeconomic announcement day, while the VW spread is 9.40 bps ($t = 2.65$). Both spreads are economically large and statistically significant. With approximately 30 macroeconomic announcements per year, these correspond to annualized returns of 6.2% and 2.9%, respectively. This pattern suggests that macroeconomic announcements systematically reprice earlier earnings news, lowering the returns of recent announcers relative to those of similar firms. This return differential captures the repricing premium.

3 A Dynamic Model

In this section, we present a dynamic general equilibrium model of learning across both earnings and macroeconomic announcements to formalize the repricing channel. The model provides a quantita-

tive benchmark for our empirical analysis and allows us to assess the importance of this mechanism in shaping the cross section of stock returns. Details of the model solution and derivations are provided in Appendix A.

3.1 Model Setup

Preferences and Endowment We consider an endowment economy in which the representative agent has Duffie and Epstein (1992) recursive preferences with time discount rate ρ, constant risk aversion γ, and constant intertemporal elasticity of substitution (IES) ψ. We assume $\gamma > 1 > 1/\psi$, so that preferences satisfy the strong generalized risk sensitivity condition (strong GRS) of Ai, Han, and Xu (2022). This condition implies a high-frequency announcement-day risk premium and ties its magnitude to the informativeness of the announcement.

We assume that aggregate consumption, C_t, evolves according to the diffusion process:

$$\frac{dC_t}{C_t} = \theta_t dt + \sigma_C dB_{C,t}, \tag{1}$$

where θ_t represents the *unobservable* expected aggregate cash flow growth rate and σ_C is the volatility of aggregate consumption. The state variable θ_t follows an Ornstein-Uhlenbeck (OU) process:

$$d\theta_t = a\left(\bar{\theta} - \theta_t\right) dt + \sigma_\theta dB_{\theta,t}, \tag{2}$$

where a governs persistence, $\bar{\theta}$ is the long-run mean, and σ_θ is its volatility.

Suppose the dividend of firm i is proportional to aggregate consumption,

$$D_{i,t} = \delta_{i,t} C_t, \tag{3}$$

where the firm's dividend-to-consumption ratio follows a geometric Brownian motion:

$$\frac{d\delta_{i,t}}{\delta_{i,t}} = g_{i,t} dt + \sigma_u dB_{u,t} + \sigma_D dB_{D_i,t}, \tag{4}$$

with $g_{i,t}$ the *unobservable* firm-specific expected cash flow growth rate and σ_D the idiosyncratic

volatility of the dividend-to-consumption ratio. The common component $\sigma_u dB_{u,t}$ is a publicly observed aggregate dividend shock orthogonal to consumption and unpriced in equilibrium, as in Bansal and Yaron (2004). The firm's growth rate $g_{i,t}$ evolves as an OU process:

$$dg_{i,t} = b\left(\bar{g} - g_{i,t}\right) dt + \sigma_g dB_{g_i,t}, \tag{5}$$

where b is the mean-reversion rate, $\bar{g}$ is the long-run average growth rate, and σ_g is the volatility of firm-specific cash flow growth. All Brownian shocks $(B_C, B_\theta, B_u, B_{D_i}, B_{g_i})$ for all i are assumed independent. As a result, without any signals linking the dynamics of θ_t and $g_{i,t}$, they evolve independently over time.

Earnings and Macroeconomic Announcements Both the aggregate and the firm-specific expected cash flow growth components, θ_t and $g_{i,t}$, are unobservable. Investors learn about these latent states from two sources of public information. First, they observe aggregate consumption C_t and firms' dividends $D_{i,t}$. Second, investors observe discrete signals at prescheduled dates: earnings announcements (EA) and macroeconomic announcements (MA). Time is organized into recurring announcement cycles of length T, with each macroeconomic announcement marking the end of one cycle and the start of the next.

Earnings announcements occur at time τ of each cycle and provide a noisy signal of both aggregate conditions and firm-specific fundamentals. For firm i at time τ, the earnings signal is:

$$s_{E,i}(\tau) = \theta_\tau + g_{i,\tau} + \epsilon_{i,\tau},\ \epsilon_{i,\tau} \sim \mathcal{N}\left(0, \sigma^2_{E,i}(\tau)\right), \tag{6}$$

where $\epsilon_{i,\tau}$ is normally distributed with mean zero and variance $\sigma^2_{E,i}(\tau)$.

Consequently, earnings announcements confound aggregate and firm-specific news. This structure creates a signal extraction problem: investors cannot perfectly distinguish between aggregate conditions (θ) and firm-specific fundamentals (g_i) at the time of the announcement.

The noise variance $\sigma^2_{E,i}(\tau)$ quantifies the information quality of the earnings announcement, with lower variance indicating a more informative signal. There is a cross section of $2N$ firms that differ

in the informativeness of their earnings announcements about aggregate conditions. We assume that N firms announce simultaneously and that $\sigma_{E,i}(\tau)$ is drawn from a common distribution F_E, which is log-uniform on the interval $[\underline{\sigma}_E, \overline{\sigma}_E]$, with realizations assigned to firms by random permutation in each cycle.[3] The remaining N firms are non-announcers, corresponding to the limiting type $\sigma^2_{E,i}(\tau) \to \infty$. Note that the informativeness of each firm's earnings varies across announcements rather than being a fixed firm characteristic: the same firm's earnings may be more informative in some cycles than others (Ai, Han, and Xu (2022)).

Macroeconomic announcements occur at prescheduled times $0, T, 2T, \ldots$. For tractability, we model the MA as a signal that fully reveals the true aggregate state θ:[4]

$$s_M(T) = \theta_T. \tag{7}$$

For notational convenience, we focus on a representative announcement cycle $[0, T]$. Let T^- and T^+ denote the instants immediately before and after the macroeconomic announcement at T, with T^+ identified with time 0 of the next cycle. Likewise, let τ^- and τ^+ denote the instants immediately before and after the earnings announcement at τ. We consider the representative case in which the earnings announcement occurs immediately prior to the macroeconomic announcement, so that $\tau^+ = T^-$. In other words, the instant after the earnings announcement coincides with the instant before the macro announcement.[5] The timeline is summarized as follows:

$$\ldots 0 \longrightarrow \underbrace{\underset{\tau^-}{\text{EA}} \qquad \underset{\tau^+=T^-}{\text{MA}} \qquad \underset{T^+}{}}_{\text{Cycle 1}} \longrightarrow \underbrace{\underset{2\tau^-}{\text{EA}} \qquad \underset{2\tau^+=2T^-}{\text{MA}} \qquad \underset{2T^+}{}}_{\text{Cycle 2}} \longrightarrow \ldots$$

This timeline allows us to isolate the repricing mechanism: investors first form joint beliefs at the

[3] On each earnings date, N values $\{\sigma_{E,1}, \ldots, \sigma_{E,N}\}$ are drawn from F_E and assigned to firms by random permutation (sampling without replacement across firms within that cycle). This permutation is redrawn across earnings dates, ensuring that for any firm i, the sequence of signal noise variances $\sigma^2_{E,i}(\tau)$ is independent across cycles. This assumption ensures that the value function depends only on the aggregate state rather than on firm-specific histories; we formalize this result in Appendix C.3.

[4] Allowing the MA to be noisy or heterogeneous across different types of announcements would preserve the qualitative direction of the repricing mechanism, but would substantially increase the state space of the model by introducing additional cross-sectional covariances, and would lose tractability. We therefore abstract from this extension.

[5] This timing assumption is again for tractability: if the two announcements were separated in time, the associated covariances would evolve between announcements and become additional state variables.

earnings announcement, which are subsequently disentangled at the macroeconomic announcement. We refer to firms that announce immediately before the macroeconomic announcement as "recent announcers", because their earnings news is recent relative to the macro news.

Dynamics of Beliefs and Repricing Since θ_t and $g_{i,t}$ are unobservable, equilibrium prices and quantities depend on investors' posterior beliefs. The standard Kalman filter implies that the posterior distribution is summarized by the first two moments. Let $\hat{\theta}_t \equiv \mathbb{E}_t[\theta_t]$ and $\hat{g}_{i,t} \equiv \mathbb{E}_t[g_{i,t}]$ denote the posterior means of the aggregate and firm-specific cash flow growth rates, respectively. The uncertainty is summarized by the posterior variances: $q_{\theta\theta}(t) \equiv \mathbb{E}[(\hat{\theta}_t - \theta_t)^2]$ for the common component and $q_{ii}(t) \equiv \mathbb{E}[(\hat{g}_{i,t} - g_{i,t})^2]$ for firm i's idiosyncratic component. We further define the posterior covariance between the aggregate and firm-specific components as $q_{\theta g_i}(t) \equiv \mathbb{E}\big[(\theta_t - \hat{\theta}_t)(g_{i,t} - \hat{g}_{i,t})\big]$, and the posterior cross-firm covariance as $q_{ij}(t) \equiv \mathbb{E}\big[(g_{i,t} - \hat{g}_{i,t})(g_{j,t} - \hat{g}_{j,t})\big]$ for $i \neq j$.

Between announcements, $t \in (0, \tau)$, investors update their beliefs using a Kalman-Bucy filter. We characterize the resulting belief dynamics in Lemma A.1 of Appendix A.1.

Before characterizing belief updates at announcement times, it is useful to define the *informativeness* of firm i's earnings announcement at time τ,

$$\alpha_i(\tau) \equiv \frac{q_{ii}^-(\tau)}{q_{ii}^-(\tau) + \sigma_{E,i}^2(\tau)} \in [0, 1]\,. \tag{8}$$

This index measures the weight investors place on the earnings signal relative to prior uncertainty. For recent announcers, $\alpha_i(\tau) > 0$; the non-announcer benchmark is the limiting case $\alpha_i(\tau) = 0$. A more precise earnings announcement (lower $\sigma_{E,i}^2(\tau)$) increases $\alpha_i(\tau)$: as the signal becomes perfectly informative, $\alpha_i(\tau) \to 1$, whereas $\alpha_i(\tau) \to 0$ when the signal is highly noisy.

We now summarize how beliefs update at the earnings and macroeconomic announcements. The posterior moments and their full derivations are provided in Lemma A.2 of Appendix A.1.

Updates at the Earnings Announcement τ: After the earnings announcement at time τ, the posterior mean updates for θ and g_i are weighted averages of their respective priors and signals:

$$\hat{\theta}^+(\tau) = (1-\omega(\tau))\,\hat{\theta}^-(\tau) + \omega(\tau) z_\Sigma(\tau), \tag{9}$$

$$\hat{g}_i^+(\tau) = (1-\alpha_i(\tau))\,\hat{g}_i^-(\tau) + \alpha_i(\tau)\left(s_{E,i}(\tau) - \hat{\theta}^+(\tau)\right), \tag{10}$$

where $z_\Sigma(\tau)$ is the precision-weighted average aggregate signal extracted from all individual earnings announcements, and $\omega(\tau)$ is the weight investors place on this pooled signal, both provided in Appendix A.1.

The first equation says that investors pool the information about aggregate conditions contained in all earnings announcements. The second says that investors subtract the updated estimate of the aggregate state from firm i's earnings signal and attribute the remaining component to the firm.

We are specifically interested in how the posterior beliefs about aggregate and firm-specific components become correlated after the earnings announcement. We start from the covariance decomposition identity. Applying the law of total covariance with respect to the earnings-announcement signals gives

$$\underbrace{q^-_{\theta g_i}(\tau)}_{\text{unconditional covariance}=0} = \underbrace{\mathrm{Cov}_{\tau^-}\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}\right)}_{\text{covariance of conditional means}\geq 0} + \underbrace{\mathbb{E}_{\tau^-}\left[q^+_{\theta g_i}(\tau)\right]}_{\text{expected conditional covariance}\leq 0}. \tag{11}$$

This decomposition distinguishes two different notions of covariance. The first term captures how the posterior estimates of the aggregate and firm-specific components comove across possible realizations of the earnings signals. The second captures the covariance of the remaining uncertainty about the two components after conditioning on the realized signals. As we show below, the former is positive, whereas the latter is negative.

We establish the three terms in turn. First, before observing the earnings signals, their unconditional (prior) covariance is zero: $q^-_{\theta g_i}(\tau) = 0$. The reason is that the preceding macroeconomic announcement fully revealed θ ($q_{\theta g_i}(0) = 0$), and the two states θ and g_i subsequently evolved with independent shocks; therefore $q_{\theta g_i}(t)$ remains zero until the current earnings announcement.

Second, these belief updates imply that, conditional on information at τ^-, the two post-EA posterior estimates comove positively:

$$\mathrm{Cov}_{\tau^-}\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+\right) = \alpha_i(\tau) q_{\theta\theta}^+(\tau) \geq 0. \tag{12}$$

The intuition is that the earnings signal $s_{E,i} = \theta + g_i + \epsilon_i$ loads positively on both aggregate and firm-specific components, so good earnings news raises both posterior beliefs and bad news lowers both. The two posterior beliefs therefore move in the same direction. Moreover, a more informative earnings announcement (a higher $\alpha_i(\tau)$ and lower $\sigma_{E,i}^2(\tau)$) resolves more uncertainty, so investors update their beliefs more strongly. This amplifies the joint update and the resulting positive earnings-day comovement.

Lastly, it follows immediately from the covariance decomposition identity that the posterior covariance of the remaining uncertainty becomes negative after conditioning on the realized earnings signals:[6]

$$q_{\theta g_i}^+(\tau) = -\alpha_i(\tau) q_{\theta\theta}^+(\tau) \leq 0. \tag{13}$$

Intuitively, the earnings signals reveal only a noisy sum, $\theta + g_i$, rather than the two components separately. Conditional on the observed signals, attributing more to the aggregate component leaves less attributable to the firm-specific component, and vice versa. Thus, the remaining estimation errors are negatively correlated.

Updates at the Macroeconomic Announcement T: We can now see how the macroeconomic announcement triggers repricing. At time T, the macroeconomic announcement fully reveals the true aggregate state θ_T, so aggregate posterior uncertainty vanishes: $q_{\theta\theta}^+(T) = 0$. This revelation leads investors to revise the beliefs formed at the prior earnings announcement and triggers the repricing of firm-specific fundamentals. The repricing mechanism is summarized in the following proposition.

[6] Because the posterior covariance is independent of the realized signal in the Gaussian model, $\mathbb{E}_{\tau^-}\left[q_{\theta g_i}^+(\tau)\right] = q_{\theta g_i}^+(\tau)$.

Proposition 1. *(The Repricing Channel) At the macroeconomic announcement T, the aggregate state is fully revealed, so that $\hat{\theta}^+(T) = \theta_T$. The macroeconomic surprise induces an opposite revision in firm-specific expectations:*

$$\hat{g}_i^+(T) - \hat{g}_i^+(\tau) = -\alpha_i(\tau)\left(\theta_T - \hat{\theta}^+(\tau)\right). \tag{14}$$

Conditional on information at T^-, the two post-macro announcement posterior beliefs comove negatively:

$$\mathrm{Cov}_{T^-}\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+\right) = -\alpha_i(\tau) q_{\theta\theta}^+(\tau) \leq 0. \tag{15}$$

Proof. See Appendix A.1. □

The proposition formalizes the *repricing channel*. Because the earnings signal links the aggregate and firm-specific components through their sum, revealing θ at time T changes how investors attribute the earlier earnings signal. Equation (14) shows that when macroeconomic conditions are stronger than expected ($\theta_T > \hat{\theta}_\tau^+$), investors realize that more of the earlier earnings strength reflected aggregate conditions and less reflected firm-specific fundamentals. They therefore revise $\hat{g}_i$ downward. Conversely, weaker-than-expected macroeconomic conditions induce an upward revision in $\hat{g}_i$.

Moreover, the magnitude of this repricing is governed by the informativeness index $\alpha_i(\tau)$. Firms with more informative earnings announcements (higher $\alpha_i(\tau)$) experience stronger repricing because the earnings signal more tightly identifies the sum of aggregate and firm-specific cash-flow growth, $\theta + g_i$; thus, revisions to θ translate nearly one-for-one into opposite revisions to g_i. When earnings announcements are less informative, the link between the aggregate and firm-specific components is weaker, and repricing is muted.

Implications for Announcement Betas: Since announcement betas are approximately proportional to the covariances of conditional expectations, Equations (12) and (15) map directly into announcement-day risk exposures and risk premia. To formally compute the CAPM beta, we define the market return as the equal-weighted average of returns from all firms (recent announcers

and non-announcers). We then define earnings announcement and macro announcement betas as follows. Details of the beta computations are provided in Appendix A.5.

Definition 1. *(Earnings- and Macro-Announcement Betas) Conditional on $\sigma_{E,i}(\tau)$, the earnings announcement beta is:*

$$\beta_{E,i}(\sigma_{E,i}(\tau)) = \frac{\mathrm{Cov}_{\tau^-}\left(R_{E,i}, R_{E,M} \middle| \sigma_{E,i}(\tau)\right)}{\mathrm{Var}_{\tau^-}\left(R_{E,M} \middle| \sigma_{E,i}(\tau)\right)}, \tag{16}$$

where the earnings announcement return for firm i is $R_{E,i} \equiv \frac{p_i(\tau^+)}{p_i(\sigma_{E,i}(\tau);\tau^-)}$, and the market return is $R_{E,M} \equiv \frac{1}{2N}\sum_{j=1}^{2N} R_{E,j}$. Similarly, the macro announcement beta is

$$\beta_{M,i}(\sigma_{E,i}(\tau)) = \frac{\mathrm{Cov}_{T^-}\left(R_{M,i}, R_{M,M} \middle| \sigma_{E,i}(\tau)\right)}{\mathrm{Var}_{T^-}\left(R_{M,M} \middle| \sigma_{E,i}(\tau)\right)}, \tag{17}$$

where $R_{M,i} \equiv \frac{p_i(T^+)}{p_i(\sigma_{E,i}(\tau);T^-)}$, and $R_{M,M} \equiv \frac{1}{2N}\sum_{j=1}^{2N} R_{M,j}$. Here $p_i(t) \equiv p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)$ is firm i's price-to-dividend ratio, and $p_i(\sigma_{E,i}(\tau);\tau^-) \equiv p(\sigma_{E,i}(\tau); \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, q^-_{ii,\tau}, \tau^-)$ denotes the pre-announcement value conditional on firm i's noise type, with $p_i(\sigma_{E,i}(\tau);T^-)$ defined analogously.

Firm returns depend on both aggregate and firm-specific beliefs $(\hat{\theta}, \hat{g}_i)$, whereas the market return is determined by the aggregate state $(\hat{\theta})$. With the (log) price-to-dividend ratio approximately linear and monotone in beliefs, the announcement beta is proportional to $\mathrm{Cov}(\hat{\theta}, \hat{\theta} + \hat{g}_i) = \mathrm{Var}(\hat{\theta}) + \mathrm{Cov}(\hat{\theta}, \hat{g}_i)$. Since the variance of the market return on a given announcement day, $\mathrm{Var}(\hat{\theta})$, is common across stocks, all cross-sectional variation in announcement betas is driven by the covariance between aggregate and firm-specific beliefs $\mathrm{Cov}(\hat{\theta}, \hat{g}_i)$. Thus, the beta inherits the properties of the covariance dynamics derived in Equations (12) and (15).

At the earnings announcement, the positive covariance ($\mathrm{Cov}_{\tau^-}(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}) \geq 0$) implies a positive earnings announcement premium since earnings announcements provide information about aggregate conditions, consistent with Savor and Wilson (2016). In addition, since $\mathrm{Cov}_{\tau^-}(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau})$ increases in $\alpha_i(\tau)$, more informative earnings announcements are associated with higher earnings announcement betas and higher earnings announcement premia.

We establish that, at the macroeconomic announcement, the negative covariance ($\mathrm{Cov}_{T^-}(\hat{\theta}^+_T, \hat{g}^+_{i,T}) \leq$

0) dampens the firm's return covariance with the market and thereby lowers its macro-announcement beta. The lower beta implies a lower risk premium relative to firms for which this repricing channel is absent. Moreover, because $\text{Cov}_{T^-}(\hat{\theta}_T^+, \hat{g}_{i,T}^+)$ decreases in $\alpha_i(\tau)$, firms with more informative earnings announcements exhibit lower macroeconomic announcement betas and macroeconomic announcement premia.

3.2 Asset Prices

We consider a cross section of equity claims indexed by i. Equity i is a claim on the dividend:

$$\frac{dD_{i,t}}{D_{i,t}} = (\hat{\theta}_t + \hat{g}_{i,t})dt + \sigma_C d\hat{B}_{C,t} + \sigma_u dB_{u,t} + \sigma_D d\hat{B}_{D_i,t}, \tag{18}$$

which follows immediately from Equation (3).

Under recursive preferences, the representative agent's value function depends on beliefs about aggregate conditions, but not on firm-specific fundamentals. Consequently, only revisions in beliefs about aggregate conditions move the stochastic discount factor (SDF) at announcement times. The value-function solution is provided in Lemma A.3 in Appendix A.2.

Given the value function, we construct the pricing kernel. In the interior of $(0, \tau)$, i.e., in the absence of announcements, the state price density M_t evolves as

$$\frac{dM(\hat{\theta}_t, t)}{M(\hat{\theta}_t, t)} = -r(\hat{\theta}_t, t)dt - \sigma_M(\hat{\theta}_t, t)d\hat{B}_{C,t}, \tag{19}$$

where the risk-free rate $r(\hat{\theta}_t, t)$ and the market price of risk $\sigma_M(\hat{\theta}_t, t)$ are given in Equations (A.42) and (A.43) in Appendix A.3.

We now characterize the dynamics of the individual firm's price-to-dividend ratio. Since dividends depend on $\hat{\theta}_t$ and $\hat{g}_{i,t}$, the price-to-dividend ratio depends on the posterior means, time, and the entire variance-covariance matrix of beliefs (i.e., $\{q_{\theta\theta}, q_{ii}, q_{\theta g_i}, q_{ij}\}_{i=1,\ldots,N}$ for $i \neq j$). However, our assumption that the macroeconomic announcement fully reveals the aggregate state substantially simplifies this problem. We show that in the interior of the cycle, the price-to-dividend ratio for firm i depends on only four state variables—$\hat{\theta}_t$, $\hat{g}_{i,t}$, $q_{ii}(t)$, and t—with one additional state vari-

able, $\sigma^2_{E,i}(\tau)$, entering only through boundary conditions at announcement dates.[7] We denote the price-to-dividend ratio by $p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)$, so that the stock price is given by $p(\cdot)D_{i,t}$. By definition, the stock price equals the discounted expected future dividends:

$$p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)D_{i,t} = \mathbb{E}\left[\int_0^\infty \frac{M_{t+s}}{M_t} D_{i,t+s} ds \mid \hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right]. \tag{20}$$

The partial differential equation (PDE) and boundary conditions that pin down $p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)$ are given in Lemma A.4 of Appendix A.3. Given the pricing kernel and the price-to-dividend ratio, we can characterize the risk premium, which consists of two components: (i) a continuous instantaneous premium accruing in the interior of $(0, \tau)$ (given in Lemma A.5 of Appendix A.3), and (ii) a discrete announcement premium realized at the boundary.

We are specifically interested in the discrete announcement premia realized on earnings and macroeconomic announcement days. The following proposition summarizes these results.

Proposition 2. *(Announcement Premium) Conditional on $\sigma_{E,i}(\tau)$, the expected earnings- and macro-announcement returns are*

$$\mathbb{E}_{\tau^-}\left[R_{E,i} \mid \sigma_{E,i}(\tau)\right] = \frac{\mathbb{E}_{\tau^-}\left[p_i(\tau^+) \mid \sigma_{E,i}(\tau)\right]}{p_i(\sigma_{E,i}(\tau); \tau^-)},$$
$$\mathbb{E}_{T^-}\left[R_{M,i} \mid \sigma_{E,i}(\tau)\right] = \frac{\mathbb{E}_{T^-}\left[p_i(T^+) \mid \sigma_{E,i}(\tau)\right]}{p_i(\sigma_{E,i}(\tau); T^-)}.$$

Lemma A.4 in Appendix A.3 provides the full earnings- and macro-announcement boundary expressions.

Proof. See Appendix A.3. □

Appendix A.3 shows that, under the strong GRS preference condition, the announcement SDF decreases in $\hat{\theta}_t$, whereas the price-to-dividend ratio increases in $\hat{\theta}_t$. When beliefs about aggregate conditions jump at an announcement ($\hat{\theta}_T^- \to \hat{\theta}_T^+ = \theta_T$), the SDF and asset prices therefore comove

[7] Specifically, the posterior variance of aggregate cash flow growth, $q_{\theta\theta}$, is deterministic over time (see Equation (A.3)) and can therefore be absorbed into time t. Furthermore, the covariances $q_{\theta g_i}$ and q_{ij} are zero in the interior and jump only at earnings and macroeconomic announcements. For firm i, these jumps can be summarized by $\{\sigma^2_{E,i}(\tau), q^-_{ii}(\tau)\}$ (see Lemma A.2 in Appendix A.1).

negatively. As established in Ai and Bansal (2018), this negative covariance generates positive *average* earnings- and macro-announcement expected returns, consistent with the empirical evidence of earnings and macroeconomic announcement premia in Savor and Wilson (2013, 2016).

Our primary focus, however, is the cross-sectional repricing risk on macroeconomic announcement days, rather than the average announcement premium. To isolate the repricing channel, we measure risk premia of recent announcers relative to a benchmark non-announcer, defined as the limiting case in which earnings announcements are completely uninformative.

Definition 2. *(The Repricing Premium) Conditional on the earnings-signal noise $\sigma_{E,i}(\tau)$, the repricing premium for firm i at the macroeconomic announcement T is defined as the expected return difference on macro announcement days between recent announcers and non-announcers:*

$$\pi_i^{Rep} \equiv \mathbb{E}_{T^-}\left[R_{M,i} \mid \sigma_{E,i}(\tau)\right] - \mathbb{E}_{T^-}\left[R_{M,non}\right], \tag{21}$$

where $R_{M,i}$ is the macro announcement return for recent announcer i, and $R_{M,non}$ is the return for a non-announcer (a firm with an uninformative earnings signal, $\sigma_{E,i}(\tau) \to \infty$).

The repricing premium isolates how prior earnings news changes a firm's expected return at the subsequent macroeconomic announcement. On macroeconomic announcement days, the aggregate state θ_T is fully revealed and constitutes a common source of risk for all firms. For the non-announcer benchmark, the macroeconomic announcement revises aggregate beliefs but leaves firm-specific beliefs unchanged; these firms carry pure aggregate risk. For a recent announcer, the negative covariance in Proposition 1 attenuates the firm's comovement with the market. When positive macro news arrives (a state of low marginal utility), the aggregate component of the stock price rises, but the firm-specific component is revised downward. This dampens the firm's upside in good states relative to the non-announcer. Conversely, when negative news arrives (a state of high marginal utility), the firm receives an upward revision. The repricing component therefore comoves positively with the SDF: it pays off precisely in the high-marginal-utility states. Relative to the non-announcer, the firm requires less risk compensation, resulting in a negative repricing

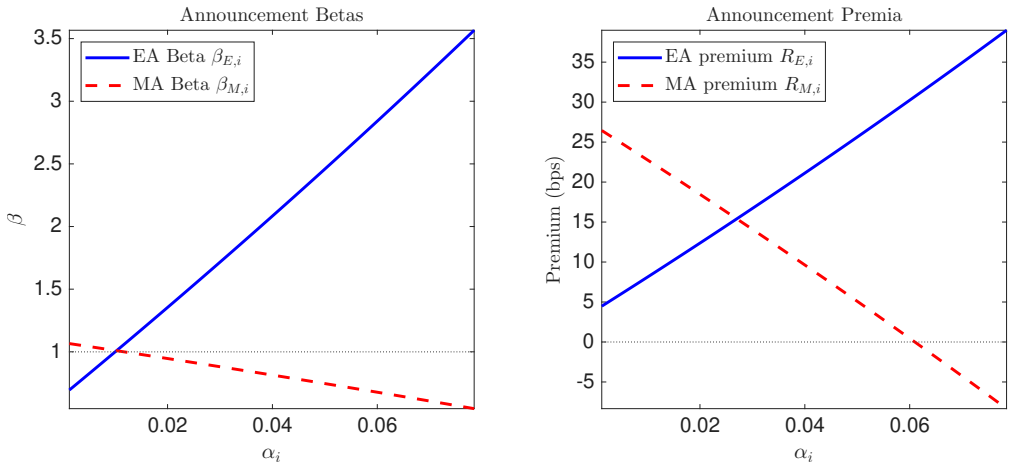
premium: $\pi_i^{Rep} < 0$.[8]

Crucially, the repricing premium is heterogeneous across firms. More informative earnings announcements (higher $\alpha_i(\tau)$ or smaller $\sigma_{E,i}(\tau)$) generate a stronger positive covariance $\text{Cov}_{\tau^-}(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+)$ at the earnings announcement, leading to a higher earnings-day beta $\beta_{E,i}$. Yet this same informativeness leads to a more negative covariance $\text{Cov}_{T^-}(\hat{\theta}_T^+, \hat{g}_{i,T}^+)$ at the macroeconomic announcement. Consequently, firms with more informative earnings exhibit a lower macro-day beta $\beta_{M,i}$ and earn a lower risk premium on macro days compared to firms with noisier earnings signals. Thus, cross-sectional heterogeneity in the informativeness of earnings announcements maps directly into the magnitude of the repricing premium.

3.3 Policy Functions

In this section, we use the policy functions implied by the model to illustrate the central economic mechanism—the repricing channel—and its implications for cross-sectional returns.

Figure 1: Model-Implied Betas and Risk Premia



The left panel plots the model-implied earnings announcement (EA) beta (blue solid line) and macroeconomic announcement (MA) beta (red dashed line) defined in Definition 1, as functions of the earnings-signal informativeness index $\alpha_i(\tau)$. The right panel plots the corresponding EA-day expected return (blue solid line) and MA-day expected return (red dashed line), characterized in Proposition 2. Both panels evaluate the policies at the representative state $\hat{\theta} = \bar{\theta}$, $\hat{g}_i = \bar{g}$, with the firm's posterior variance $q_{ii}^-(\tau)$ held at its mean pre-announcement level. All model parameters are given in Table 2.

Figure 1 brings the model's implications together. We have established that the covariance

[8]Note that this conclusion does *not* depend on the *sign* of the shocks: because the repricing premium is an expectation over all possible announcement outcomes, it is governed by the covariance $\text{Cov}_{T^-}(\hat{\theta}_T^+, \hat{g}_{i,T}^+)$ rather than by the realized surprise.

between beliefs about aggregate conditions and firm-specific fundamentals is proportional to the informativeness of the earnings announcement $\alpha_i(\tau)$ (see Equations (12) and (15)). The left panel illustrates the announcement beta dynamics, and the right panel plots the corresponding expected returns. The earnings announcement beta $\beta_{E,i}$ and expected return $R_{E,i}$ (blue solid lines) increase monotonically with $\alpha_i(\tau)$: more precise earnings signals resolve more aggregate uncertainty, requiring a higher earnings-announcement premium. In contrast, the macro-announcement beta $\beta_{M,i}$ and expected return $R_{M,i}$ (red dashed lines) decrease monotonically as $\alpha_i(\tau)$ rises. This pattern reflects the repricing channel: a more informative earnings announcement amplifies the subsequent reattribution of prior earnings news, so the macro-announcement beta and premium decrease. Thus, heterogeneity in the informativeness of earnings announcements provides the beta and return patterns we test in Section 4.

3.4 Timing: Recent and Distant Announcers

In this section, we examine how the timing of earnings announcements relative to macroeconomic news determines the strength of the repricing channel. We contrast a counterfactual "distant announcer" (firm j) against the previously defined recent announcer (firm i) to isolate the mechanism.

As before, we consider an announcement cycle over the interval $t \in [0, T]$, where $t = T$ denotes the arrival of the current macroeconomic announcement. The sequence of events is structured such that firm i announces immediately before each macroeconomic announcement, while firm j announces immediately after it:

$$\ldots \longrightarrow \underbrace{\underset{0}{\text{EA}_j} \longrightarrow \underset{\tau_i}{\text{EA}_i} \xrightarrow{\text{Pre-MA}} \underset{T}{\text{MA}}}_{\text{Cycle 1}} \xrightarrow{\text{Post-MA}} \underbrace{\underset{\tau_j}{\text{EA}_j} \longrightarrow \underset{2\tau_i}{\text{EA}_i} \xrightarrow{\text{Pre-MA}} \underset{2T}{\text{MA}}}_{\text{Cycle 2}} \longrightarrow \ldots$$

Firm i is a recent announcer, with an earnings announcement at τ_i immediately preceding the macroeconomic announcement ($\tau_i^+ = T^-$). As shown in earlier sections, this timing induces the repricing effect. Because the earnings signal arrives before θ_T is revealed, investors cannot perfectly disentangle aggregate from firm-specific news. This confounding induces a negative covariance $q^+_{\theta g_i}(\tau_i) \leq 0$ immediately before the macroeconomic announcement, generating a negative repricing

premium.

In contrast, firm j is a distant announcer, scheduled to announce earnings at τ_j, immediately following the current macroeconomic announcement, i.e., $\tau_j^- = T^+$. Within the recursive structure of the announcement cycle, the time T^+ effectively marks the restart of a new cycle. This timing schedule therefore implies that firm j's current announcement occurs at the beginning of the next cycle. Consequently, firm j is the "distant" announcer, as its earnings signal is the farthest from the next macro announcement at time $2T$.

This difference in timing leads to distinct asset pricing dynamics. Because the earnings signal arrives after the aggregate state θ_T is fully revealed at time T, investors face no signal extraction problem. They can simply subtract the known aggregate component from the total earnings signal to isolate the firm-specific component. This perfect disentangling implies that the firm starts the subsequent cycle with uncorrelated beliefs: $q^+_{\theta g_j}(\tau_j) = 0$.

Consequently, when the next macroeconomic announcement arrives at $2T$, firm j has no pre-existing covariance to correct. The repricing channel is therefore absent, and firm j's return is driven solely by aggregate news. In this sense, firm j resembles the non-announcer benchmark: the repricing component is absent in both cases. The following proposition formalizes the belief dynamics for the distant announcer.

Proposition 3. *(Distant Announcer) Consider a distant announcer j whose most recent earnings announcement occurred immediately after the previous fully revealing macroeconomic announcement. Then, at the current macroeconomic announcement T, the conditional covariance between aggregate and firm-specific posterior beliefs is zero:*

$$\mathrm{Cov}_{T^-}\left(\hat{\theta}^+_T, \hat{g}^+_{j,T}\right) = 0. \tag{22}$$

Proof. See Appendix A.4. □

4 Empirical Evidence and Quantitative Analysis

In this section, we calibrate the model to match standard aggregate consumption and asset pricing moments. We then test the model's central repricing mechanism in the data and replicate the same empirical exercises using simulated model data. Our analysis proceeds in four steps: (i) quantifying the repricing premium by comparing recent announcers with non-announcers; (ii) analyzing the cross-sectional variation in the repricing premium driven by the informativeness of earnings announcements; (iii) testing the implications of earnings-announcement timing; and (iv) providing direct empirical evidence on belief revisions using analyst forecasts.

4.1 Data and Calibration

Data Our sample consists of publicly traded U.S. firms from January 1994 to December 2024. Following Ai and Bansal (2018), we focus on four major scheduled macroeconomic announcements: FOMC meetings, GDP releases, Nonfarm Payroll Employment, and the ISM Manufacturing Index. Daily stock returns, market capitalization, and industry classifications (SIC codes) are obtained from CRSP. Earnings announcement dates and timestamps are drawn from the intersection of Compustat and the Thomson Reuters I/B/E/S database. High-frequency intraday data from Trade and Quote (TAQ) are used to construct measures of stock-market comovement, including daily betas. We use individual analyst earnings forecasts from I/B/E/S to measure belief revisions, focusing on changes in expected annual earnings per share (EPS). Macroeconomic surprises are constructed using consensus forecasts from Bloomberg surveys and high-frequency monetary policy shocks from Bauer and Swanson (2023). Appendix B.1 provides detailed descriptions of data construction, including the processing of high-frequency returns, the identification of earnings and macroeconomic announcement dates, the construction of macroeconomic surprises, and analyst forecast revisions.

Calibration We calibrate the model to match standard annualized macroeconomic and asset pricing moments. The simulation features $N = 100$ announcing firms and 100 non-announcing firms with quarterly earnings announcements ($T = 1/4$). Table 2 reports the annualized parameter

values. Appendix C describes the numerical solution method. We list the asset pricing moments in the data and the corresponding statistics for our calibrated model in Table 3.

Table 2: Calibrated Parameters

Para.	Value	Description	Para.	Value	Description
σ_C	0.021	vol of cons. growth	$\bar{g}$	–0.001	mean of latent cash flow
a	0.14	persistence of long-run cons. growth	σ_g	0.007	vol of latent cash flow
$\bar{\theta}$	0.0135	mean of long-run cons. growth	σ_u	0.13	vol of agg. div. shock
σ_θ	0.009	vol of long-run cons. growth	σ_D	0.27	idio. vol of div. growth
b	0.05	persistence of cash flow	σ_E	[0.054, 0.46]	EA signal noise range

All parameter values are annualized.

Preference parameters follow the long-run risk literature (e.g., Bansal and Yaron (2004); Ai and Bansal (2018)): risk aversion is $\gamma = 16$, the IES is $\psi = 2$, and the subjective discount rate is $\rho = 0.5\%$. Aggregate consumption parameters ($\bar{\theta} = 1.35\%$, $\sigma_C = 2.1\%$, $a = 0.14$) match the mean, volatility, and autocorrelation of U.S. consumption growth over 1929–2024: 1.72% (1.71%), 2.74% (2.65%), and 0.34 (0.33) in the data (model). Given $\bar{\theta}$, $\bar{g} = -0.1\%$ matches the mean of aggregate dividend growth—the dividend stream of the market portfolio (1.59% in the data, 1.61% in the model); the aggregate dividend shock $\sigma_u = 0.13$ matches its volatility (10.69% versus 11.06%); and the persistence $b = 0.05$ matches its autocorrelation (0.19 versus 0.31). We set $\sigma_D = 0.27$, calibrated to the idiosyncratic volatility of individual stock returns (25% versus 29%). The two signal-noise bounds $\sigma_{E,i}(\tau) \in [0.054, 0.46]$, distributed log-uniformly across firms, are set to match the average earnings-announcement-day return (11.40 bps versus 12.02 bps) and the volatility of earnings-day returns (6.92% versus 4.86%). $\sigma_g = 0.007$ is disciplined by the cross-sectional dispersion of firms' long-run average dividend growth (3.65% versus 1.95%).

Our model generally matches both the asset market return and volatility moments in the data well. The average equity market premium in the model is 7.05%, and the volatility of the annual market return is 15.3%. Our model generates an average risk-free rate of 0.60% with a standard deviation of 0.77%. In the model, the average market return on macro-announcement days is 23.16 bps, compared with 1.64 bps on non-announcement days.

Table 3: Asset Pricing Moments

		Data	Model			Data	Model
$\mathbb{E}[R]-r$	Equity premium (%)	7.75	7.05	$\text{Std}[dD/D]$	Div. vol (%)	10.69	11.06
$\text{Std}[R]$	Return vol (%)	18.51	15.26	$\text{AC}[dD/D]$	Div. AC(1)	0.19	0.31
$\mathbb{E}[r]$	Risk-free rate (%)	0.20	0.60	IVol_i	Idio. vol (%)	25.01	29.02
$\text{Std}[r]$	RF vol (%)	1.08	0.77	$\text{Std}_i[g_i]$	Disp. of div. growth (%)	3.65	1.95
$\mathbb{E}[dC/C]$	Cons. growth (%)	1.72	1.71	$\mathbb{E}\left[R^{\text{MA}}\right]$	MA return (bps)	19.03	23.16
$\text{Std}[dC/C]$	Cons. vol (%)	2.74	2.65	$\mathbb{E}\left[R^{\text{NA}}\right]$	Non-ann. return (bps)	2.50	1.64
$\text{AC}[dC/C]$	Cons. AC(1)	0.34	0.33	$\mathbb{E}\left[R_i^{\text{EA}}\right]$	EA return (bps)	11.40	12.02
$\mathbb{E}[dD/D]$	Div. growth (%)	1.59	1.61	$\text{Std}\left[R_i^{\text{EA}}\right]$	EA return vol (%)	6.92	4.86

Macroeconomic and asset pricing moments are annualized; announcement-day return moments are daily.

4.2 The Repricing Premium: Recent Announcers vs. Non-Announcers

The first implication of our model is that the repricing premium on macroeconomic announcement days is negative: firms with recent earnings announcements earn lower expected returns than firms without recent earnings news. In other words, recent earnings announcers systematically underperform non-announcers on macroeconomic announcement days.

In the model, non-announcers correspond to the limiting case of completely uninformative earnings announcements ($\alpha_i(\tau) = 0$ or $\sigma_{E,i}(\tau) \to \infty$). As shown in Figure 1, these firms carry pure aggregate risk and earn higher macroeconomic announcement premia. In contrast, for recent announcers ($\alpha_i(\tau) > 0$ or $\sigma_{E,i}(\tau) < \infty$), the revelation of aggregate news triggers an opposite revision in firm-specific beliefs, lowering both their macro-day beta and required return relative to the non-announcing benchmark.

Empirically, we test this prediction by forming two portfolios on the day preceding each macroeconomic announcement. Recent announcers are firms that released earnings within the prior 15 trading days, while non-announcers are firms without recent earnings news. We compute equal-weighted (EW) and value-weighted (VW) excess returns on the macro announcement day. To ensure a clean comparison between the two portfolios, we impose the following restrictions. First, we construct the non-announcer portfolio to match the industry and size composition of the recent announcer portfolio. Second, we retain only scheduled earnings announcements and exclude firms that announce earnings on the macro announcement day itself. Finally, we require at least 100 announcing firms per event and at least 50 firms scheduled to announce within the three days

following the macro event (to ensure comparability with subsequent timing tests). Because the CAPM holds especially well on macroeconomic announcement days (Savor and Wilson, 2014), each firm's return reflects both its unconditional market exposure (which induces fundamental comovement) and the offsetting risk exposure induced by repricing. To isolate the repricing component, we compute CAPM-neutral returns: for each firm, we subtract its estimated unconditional beta times the realized market return from its return. We then aggregate these CAPM-neutral returns within portfolios and form a long-short portfolio that is long non-announcers and short recent announcers.

Table 4: Performance of Recent Announcers and Non-Announcers on Macro Announcement Days

	Data (EW)	Data (VW)	Model
Non-Announcers (Long)	6.20	6.60	3.51
	(2.01)	(2.25)	
Recent Announcers (Short)	–1.10	0.90	–3.51
	(–0.34)	(0.38)	
Long-short	**7.30**	**5.70**	**7.02**
	(3.42)	**(1.74)**	

This table reports daily CAPM-neutral returns (in basis points) on macroeconomic announcement days for portfolios formed on the preceding trading day. The short portfolio consists of firms that issued a scheduled earnings announcement within the prior 15 trading days. The long portfolio consists of firms without recent earnings announcements, matched to recent announcers by industry and size. Returns are adjusted by subtracting each firm's unconditional CAPM beta times the market return from its return. Equal-weighted (EW) and value-weighted (VW) returns are computed for each macro announcement day. The table reports time-series means with t-statistics in parentheses. The Model column reports the corresponding CAPM-neutral macro-announcement-day returns in the calibrated model, in which recent announcers draw their signal noise from F_E and non-announcers are the limiting type $\sigma^2_{E,i}(\tau) \to \infty$; because every firm in the model has an unconditional CAPM beta of one, the model CAPM-neutral return is $R_{M,i} - R_{M,M}$. The sample includes 429 macroeconomic announcement days over 1994–2024.

Table 4 reports the results. On macroeconomic announcement days, firms with recent earnings announcements earn significantly lower average returns than non-announcers, consistent with a negative repricing premium. The equal-weighted CAPM-neutral long-short spread (non-announcers minus recent announcers) is 7.30 bps ($t = 3.42$), and the value-weighted spread is 5.70 bps ($t = 1.74$); both are statistically significant.

We replicate the same exercise in simulated model data by constructing a portfolio of recent announcers (drawn from the calibrated signal distribution F_E) and a portfolio of non-announcers (consisting of firms with $\sigma_{E,i}(\tau) \to \infty$). Because every firm in the model has an unconditional CAPM beta of one, the model counterpart of the CAPM-neutral return is simply the firm return

in excess of the market return, $R_{M,i} - R_{M,M}$. The calibrated model, in which these spreads are untargeted, generates a spread of 7.02 bps, close to the data.

A potential concern is that returns on macroeconomic announcement days, especially FOMC days, are driven by discount-rate news rather than news about aggregate cash flows. In the model, however, the two types of news are not separate: news about aggregate cash flows also changes discount rates in equilibrium, so the repricing premium is not confined to days labeled as cash-flow news. Empirically, Table B.2 of Appendix B.2.1 decomposes FOMC announcements into cash-flow and discount-rate days using the sign restriction of Jarociński and Karadi (2020): the repricing premium is present on both types of days and does not differ across them. Table B.3 of Appendix B.2.2 further splits macroeconomic announcements into FOMC and non-FOMC days; the long-short spread remains positive and statistically significant in both subsamples.

4.3 Cross-Sectional Repricing Premium

The second implication of our model concerns cross-sectional heterogeneity among recent earnings announcers. Firms whose earnings announcements are more informative about aggregate conditions exhibit higher earnings announcement betas but lower macro announcement betas and returns.

In the model, as shown in Figure 1, the earnings announcement beta is increasing in the informativeness $\alpha_i(\tau)$ (or decreasing in $\sigma_{E,i}(\tau)$), making it a natural empirical proxy for the informativeness of earnings announcements. Firms with high earnings-day betas therefore experience stronger repricing when macroeconomic news arrives, resulting in lower macro-day betas and lower macro announcement returns.

Measuring Informativeness on Announcement Days In the model, all firms share the same unconditional exposure to aggregate risk, so announcement-day returns differ across firms only through the information content of their earnings announcements. However, in the data, firms differ in their unconditional CAPM betas, and higher-beta firms earn higher returns on announcement days simply because favorable aggregate news raises the valuations of all firms (Savor and Wilson, 2014). Because our model abstracts from heterogeneity in aggregate risk exposure, which is the focus of Ai, Han, Pan, and Xu (2022), we isolate the repricing channel by removing the unconditional

CAPM component from both returns and betas.

We decompose a firm's market exposure on the earnings announcement day into a baseline CAPM component and an announcement-induced component reflecting excess comovement with the market. When an announcement conveys additional information about aggregate conditions, the firm's return comoves more strongly with the market than its unconditional beta implies. We call this excess comovement the earnings-day excess beta, β^{EA}. According to the model, a larger β^{EA} corresponds to a more informative earnings announcement; we therefore use it as an empirical proxy for announcement informativeness.

Because our object is the firm's market exposure on the announcement day itself, we estimate beta from high-frequency intraday returns from TAQ, whose within-day observations capture variation in exposure that daily returns cannot. We follow Patton and Verardo (2012), who construct intraday betas on earnings announcement days and find that a firm's beta jumps around its earnings announcement.[9] We first estimate the unconditional CAPM beta for stock i over the $W = 10$ trading days preceding the earnings announcement date:

$$\beta_i^{\text{CAPM}} = \frac{\sum_{t=1}^{W}\sum_{k=1}^{S} r_{i,t,k} r_{M,t,k}}{\sum_{t=1}^{W}\sum_{k=1}^{S} r_{M,t,k}^2},$$

where $r_{i,t,k} = \log P_{i,t,k} - \log P_{i,t,k-1}$ is the intraday log return on stock i in the kth interval of day t, $r_{M,t,k}$ is the corresponding intraday market return, and S is the number of 25-minute intraday intervals. We require at least 32 observations (2 full days of intraday data) for a β_i^{CAPM} estimate to be retained in the sample.

We then estimate the firm's realized CAPM beta on the earnings announcement day alone ($t = \tau$) using the same estimator over that day's intraday intervals:

$$\tilde{\beta}_{i,\tau}^{\text{EA}} = \frac{\sum_{k=1}^{S} r_{i,\tau,k}\, r_{M,\tau,k}}{\sum_{k=1}^{S} r_{M,\tau,k}^2},$$

and construct the firm's earnings-day excess beta, denoted $\beta_{i,\tau}^{\text{EA}}$, as the difference between this

[9] They estimate daily firm-level betas from 25-minute intraday returns, a frequency chosen to balance within-day information against market-microstructure effects. The sampling design mitigates these effects in the estimated betas: sampling the stock and the market at common clock times helps reduce the bias toward zero from asynchronous trading (Epps, 1979). Appendix B.1 details the construction.

announcement-day beta and the unconditional CAPM beta:

$$\beta_{i,\tau}^{\text{EA}} = \tilde{\beta}_{i,\tau}^{\text{EA}} - \beta_i^{\text{CAPM}}. \tag{23}$$

This measure captures the component of the firm's announcement-day beta in excess of its unconditional CAPM beta. We construct an analogous measure on macroeconomic announcement days, the macro-day excess beta, β^{MA}, as the difference between the one-day macroeconomic-announcement-day beta and the unconditional CAPM beta.[10] The earnings-day excess beta β^{EA} serves as the sorting variable in our portfolio analysis, identifying firms with earnings announcements estimated to be the most informative about aggregate conditions.

Empirical Test We sort firms that announced earnings within the prior 15 trading days into five portfolios based on their estimated earnings-day excess beta β_i^{EA}. We then form a long-short strategy that is long the least informative firms (low β^{EA}) and short the most informative firms (high β^{EA}).

As discussed above, to control for unconditional CAPM exposure and isolate the repricing channel, we focus on CAPM-neutral returns. For each stock, we subtract β_i^{CAPM} times the realized market return from the stock's return. We then aggregate these CAPM-neutral returns within each portfolio using both equal and value weights. Portfolios are formed at the close of the trading day prior to the macroeconomic announcement and held for one day. On average, the strategy includes approximately 200 stocks per event.

Table 5 reports the results. Panel A documents a strong negative relationship between the informativeness of earnings announcements and subsequent macro-announcement-day returns. Portfolio mean returns decline monotonically from P1 (least informative) to P5 (most informative) in both equal- and value-weighted specifications, indicating that firms with more informative earnings announcements exhibit a more negative repricing premium when macroeconomic news arrives. The long-short portfolio that buys low-β^{EA} firms and sells high-β^{EA} firms delivers economically and statistically significant positive returns of 22 bps (EW) and 23 bps (VW). Furthermore, Panel B

[10] Table B.5 of Appendix B.2.3 shows that higher earnings-day and macro-day excess betas are associated with higher average returns, consistent with both exposures being positively priced.

Table 5: Portfolio Performance Based on Informativeness of Earnings Announcements

	P1	P2	P3	P4	P5	P1–P5
Panel A: CAPM-Neutral Returns						
Data (EW)	16.26	7.43	6.14	–1.95	–6.05	**22.30**
	(2.92)	(1.81)	(1.69)	(–0.52)	(–1.04)	**(2.77)**
Data (VW)	17.08	7.03	0.07	–2.11	–5.93	**23.01**
	(3.42)	(1.83)	(0.02)	(–0.58)	(–1.07)	**(3.08)**
Model	3.71	2.67	0.19	–5.55	–18.55	**22.27**
Panel B: Excess Beta on EA and MA Days						
$\mathbb{E}[\beta^{\mathrm{EA}}]$	–4.44	–1.44	0.01	1.53	4.48	
	(–58.28)	(–31.06)	(0.57)	(28.62)	(59.24)	
Model	–0.28	–0.18	0.03	0.53	1.66	
$\mathbb{E}[\beta^{\mathrm{MA}}]$	0.29	0.05	–0.06	–0.17	–0.52	
	(9.47)	(2.32)	(–3.05)	(–7.93)	(–19.25)	
Model	0.06	0.04	0.00	–0.09	–0.29	

This table reports the performance of trading strategies based on the informativeness of earnings announcements, evaluated on macroeconomic announcement days. On the trading day preceding each macroeconomic announcement, firms that announced earnings within the prior 15 trading days are sorted into five portfolios (P1–P5) based on their earnings-day excess beta β^{EA}, defined as the component of the firm's announcement-day beta in excess of its unconditional CAPM beta (estimated via Equation (23)). Daily CAPM-neutral excess returns are obtained by subtracting the firm's unconditional CAPM component (the market return scaled by β_i^{CAPM}) from its daily excess return. Panel A reports equal- and value-weighted CAPM-neutral excess returns (in basis points) on macroeconomic announcement days for portfolios P1–P5 and the long-short (P1 minus P5) strategy in the data, alongside the equal-weighted portfolio returns from the model simulation. Panel B reports the average earnings-day excess beta β^{EA} and macro-day excess beta β^{MA} for each portfolio in both the data and the model. Parentheses report time-series t-statistics for the data estimates in both panels. In the model, every firm has an unconditional CAPM beta of one, so model CAPM-neutral returns are returns in excess of the market return, and the model excess betas are the announcement betas less one, $\beta_{E,i} - 1$ and $\beta_{M,i} - 1$. The sample contains fewer MA days than the samples used in the matched-portfolio tables because the quintile sort requires a valid intraday beta; it covers 345 macroeconomic announcement days from 1994 to 2024.

provides evidence for the underlying mechanism: β^{EA} is negatively related to β^{MA}, as the model predicts. Firms whose earnings announcements are most informative about aggregate conditions experience the strongest repricing, leading to lower (more negative) risk exposure and lower risk compensation on macroeconomic announcement days.

We replicate the same exercise in the simulated model. Consistent with the empirical procedure, firms are sorted into quintiles based on their earnings announcement beta, and we compute CAPM-neutral macro-announcement-day returns. In the model, unconditional CAPM betas equal one, so CAPM-neutral returns are obtained by subtracting the market return. The model counterparts of the excess betas in Panel B are the announcement betas less one, $\beta_{E,i} - 1$ and $\beta_{M,i} - 1$. The model reproduces the steep monotone pattern observed in the data. In the data, the P1–P5

spread is 22.30 bps. Our model, with these moments untargeted, generates a comparable spread of 22.27 bps. Moreover, the associated excess betas display the predicted negative relationship: on earnings announcement days, excess betas increase with the informativeness of earnings announcements, whereas on macroeconomic announcement days they decrease monotonically. This joint fit is consistent with the repricing channel generating the observed cross-sectional return spread.

4.4 Timing: Recent vs. Distant Announcers

The third implication of our model concerns the timing of the repricing effect. As shown in Section 3.4, firms that announce earnings before macroeconomic news (Recent Announcers, RA) should earn a negative repricing premium, whereas firms that announce after macroeconomic news (Distant Announcers, DA) should not. When earnings precede the macro announcement, investors confound aggregate and firm-specific information, generating the negative covariance that drives the repricing channel. In contrast, when earnings are announced after the macro event, the aggregate state is already known; consequently, the signal extraction problem disappears, and the repricing channel is absent.

To test this prediction, we compare recent announcers with distant announcers on macro announcement days, using the same sample and matching procedure as in Table 4. To keep the comparison clean, the recent-announcer portfolio consists of firms announcing earnings within five trading days before the macro event, while the distant-announcer portfolio consists of firms announcing within five trading days after the macro event. As in previous sections, we report CAPM-neutral returns.

Table 6 displays the results. Recent announcers earn significantly lower returns than distant announcers on macro announcement days, consistent with the model's predictions. Recent announcers earn –3.35 bps (EW) and 1.25 bps (VW), while distant announcers earn higher returns of 12.04 bps (EW) and 10.13 bps (VW). The long-short portfolio that buys distant announcers and sells recent announcers (DA minus RA) gives a statistically significant spread of 15.39 bps (EW) and 8.87 bps (VW).

Appendix B.2.4 shows that the repricing effect weakens as earnings news becomes stale. The

Table 6: Earnings Announcements Before and After Macroeconomic News

	EW (bps)	VW (bps)
Recent Announcers (RA)	–3.35	1.25
	(–0.99)	(0.43)
Distant Announcers (DA)	12.04	10.13
	(3.48)	(3.20)
DA – RA	**15.39**	**8.87**
	(5.61)	**(2.31)**

This table reports daily CAPM-neutral returns (in basis points) on macroeconomic announcement days for portfolios formed on the preceding trading day. Recent Announcers (RA) are firms with a scheduled earnings announcement within five trading days before the macroeconomic announcement. Distant Announcers (DA) are firms with a scheduled earnings announcement within five trading days after the macroeconomic announcement. Returns are adjusted by subtracting the unconditional CAPM beta times the market return from each firm's return. Portfolios are matched on industry and size. Equal-weighted (EW) and value-weighted (VW) returns are computed daily, and the table reports time-series means with t-statistics in parentheses. The sample includes 429 macroeconomic announcement days over 1994–2024.

negative associations of earnings-day informativeness with subsequent macro-announcement-day betas and returns are strongest for firms that announced within the preceding week and attenuate when the announcement occurred one week to one month earlier.

4.5 The Belief Revision Channel

The fourth implication of our model is a precise structural prediction about how investors revise beliefs about firm-specific fundamentals on macroeconomic announcement days. Equation (14) in Proposition 1 establishes that for firms with recent earnings announcements, the update to firm-specific beliefs at the macroeconomic announcement satisfies:

$$\underbrace{\hat{g}_i^+(T) - \hat{g}_i^+(\tau)}_{\text{Rev}_{i,T}} = -\alpha_i(\tau) \underbrace{\left(\theta_T - \hat{\theta}^+(\tau)\right)}_{\text{Surprise}_T}, \tag{24}$$

where $\alpha_i(\tau) > 0$ for recent announcers, and $\alpha_i(\tau) = 0$ for non-announcers.

The key implication is a negative relationship between revisions in firm-specific beliefs and aggregate shocks: a positive macroeconomic surprise ($\theta_T > \hat{\theta}^+(\tau)$) triggers a downward revision in firm-specific cash flow expectations, while a negative macroeconomic surprise triggers an upward revision. Intuitively, when macroeconomic data are stronger than expected, investors learn that part of the firm's earlier earnings strength was driven by favorable aggregate conditions rather than

firm-specific fundamentals. As a result, firm-specific cash flow expectations are revised downward. This belief-revision mechanism is the core driver of the repricing channel.

We test this prediction using analyst EPS forecast revisions around macroeconomic announcement days. A direct test of Equation (14) is challenging because EPS forecast revisions mix two forces: a common macro exposure and a repricing effect specific to recent announcers. The common macro exposure implies that good macro news can raise cash flow expectations for all firms. In contrast, through the repricing channel, the same positive macro shock can reduce firm-specific expectations for recent announcers. Because these two forces are jointly embedded in raw revisions, the level of revisions does not separately identify the repricing channel. To isolate the repricing channel, we run an interaction regression by comparing recent announcers to non-announcers: revisions for non-announcers capture only the common macro exposure, while the interaction term identifies the additional response of recent announcers relative to this benchmark:

$$\text{Rev}_{i,t} = \beta_1 \,\text{Surprise}_t + \beta_2 \,(\text{EA}_{i,t} \times \text{Surprise}_t) + \beta_3 \,\text{EA}_{i,t} + \chi_i + \delta_k + \varepsilon_{i,t}, \tag{25}$$

where $\text{Rev}_{i,t}$ is an individual analyst's EPS forecast revision, defined as the difference between the analyst's forecast and that analyst's own previous forecast for firm i for the same fiscal year, scaled by the absolute value of actual EPS;[11] Surprise_t is the standardized macroeconomic consensus forecast error; $\text{EA}_{i,t} = 1$ if the firm had a recent earnings announcement; χ_i are firm fixed effects; and δ_k are event-type fixed effects. On non-macroeconomic-announcement days, the surprise is set to zero. The coefficient β_1 captures the baseline sensitivity of analyst revisions to the macroeconomic surprise for non-announcers. The interaction coefficient β_2 isolates the additional response for recent announcers. If macroeconomic news only affected forecasts through the common exposure channel, then $\beta_2 = 0$. The repricing channel instead implies $\beta_2 < 0$: positive macro surprises induce analysts to revise more negatively for recent announcers than for benchmark non-announcers.

Table 7 reports the results. The interaction coefficient β_2 is negative and statistically significant

[11] A revision counts as a response to a macroeconomic release if it is filed on the release day or the following business day. Revisions filed at or after the firm's own earnings announcement on the announcement day, together with all revisions filed on the next business day, are excluded, so the measured revision reflects the response to the macroeconomic release rather than to the firm's own earnings.

Table 7: Analyst Forecast Revisions in Response to Macroeconomic Surprises

	$\text{Rev}_{i,t}$
β_1 (Surprise)	−0.34
	(−1.15)
β_2 (EA × Surprise)	−1.17
	(−2.65)
β_3 (EA)	4.32
	(16.84)
N	1,616,312
R^2	0.083
Firm FE	✓
Event-type FE	✓
Cluster (firm, date)	✓

This table reports estimates of Equation (25). The dependent variable is the analyst EPS forecast revision, defined as the difference between the analyst's forecast and that analyst's own previous forecast for firm i for the same fiscal year, scaled by the absolute value of actual EPS and multiplied by 100. Macroeconomic surprises are standardized consensus forecast errors from Bloomberg surveys for NFP, ISM, and GDP (advance estimate), and monetary policy shocks for FOMC announcements following Bauer and Swanson (2023). When multiple announcements fall on the same day, standardized surprises are averaged; days where surprises disagree in sign are dropped. Surprises are winsorized at the 0.5th and 99.5th percentiles, scaled to have unit variance within each series, and set to zero on non-macroeconomic announcement days. We exclude extreme outliers from April to July 2020. $\text{EA}_{i,t} = 1$ if the firm had a recent earnings announcement. The sample covers 1994–2024. t-statistics based on standard errors clustered two ways by firm and date are in parentheses.

(−1.17, $t = -2.65$): positive macroeconomic surprises lead to downward revisions in firm-specific growth expectations for recent announcers, and vice versa. This differential response of recent announcers is consistent with the repricing channel implied by the model.

Appendix B.2.5 reports a robustness check replacing consensus forecast errors with the demeaned announcement-day market return as an alternative proxy for macroeconomic surprises. The interaction coefficient remains negative and statistically significant, confirming that the results are not sensitive to the choice of surprise measure. In Appendix B.2.6, we further examine analyst forecasting activity around macroeconomic announcement days. We find that analyst forecast revision activity spikes on macro announcement days, with the probability of a forecast update rising by approximately 1 percentage point compared to other days, even after controlling for earnings announcement timing. Consistent with the repricing mechanism, this effect is strongest for firms with very recent earnings announcements and attenuates as the earnings signal becomes more distant.

5 Conclusion

In this paper, we identify and quantify the repricing channel of macroeconomic announcements. Because scheduled earnings announcements contain not only firm-specific but also aggregate cash flow information, the later revelation of the aggregate state triggers an opposite revision in firm-specific beliefs, and a rational capital market reprices the firm-specific component of prior earnings news. We formalize this mechanism in a dynamic general equilibrium model and show that it generates substantial cross-sectional heterogeneity in risk premia on macroeconomic announcement days.

Our empirical analysis supports the model's predictions. First, recent earnings announcers systematically underperform non-announcers on macroeconomic announcement days: a long-short portfolio that is long non-announcers and short recent announcers earns CAPM-neutral returns of approximately 6 to 7 bps per macroeconomic announcement day. Second, using high-frequency earnings-day excess betas as a proxy for the informativeness of earnings announcements, we find that firms with more informative earnings announcements experience stronger repricing effects; a long-short portfolio sorted on these excess betas earns 22 to 23 bps per macroeconomic announcement day. Third, the repricing effect depends on the timing of earnings announcements: portfolios that are long distant announcers and short recent announcers earn 9 to 15 bps per macroeconomic announcement day. Finally, using analyst EPS forecast revisions, we show that revisions for recent announcers respond more negatively to macroeconomic surprises than those for non-announcers. Calibrated to standard macroeconomic and asset-pricing moments, our model matches these patterns both qualitatively and quantitatively.

References

Ai, Hengjie, and Ravi Bansal, 2018, Risk Preferences and the Macroeconomic Announcement Premium, *Econometrica* 86, 1383–1430.

Ai, Hengjie, Mariano M. Croce, Anthony M. Diercks, and Kai Li, 2018, News Shocks and the Production-Based Term Structure of Equity Returns, *The Review of Financial Studies* 31, 2423–2467.

Ai, Hengjie, Leyla Jianyu Han, Xuhui Nick Pan, and Lai Xu, 2022, The cross section of the monetary policy announcement premium, *Journal of Financial Economics* 143, 247–276.

Ai, Hengjie, Leyla Jianyu Han, and Lai Xu, 2022, Information-driven volatility, *SSRN Electronic Journal*.

Ball, Ray, and S P Kothari, 1991, Security returns around earnings announcements, *The Accounting Review* 66, 718–738.

Bansal, Ravi, and Amir Yaron, 2004, Risks for the long run: A potential resolution of asset pricing puzzles, *The journal of Finance* 59, 1481–1509.

Barber, Brad M., Emmanuel T. De George, Reuven Lehavy, and Brett Trueman, 2013, The Earnings Announcement Premium Around the Globe, *Journal of Financial Economics* 108, 118–138.

Barndorff-Nielsen, Ole E, P Reinhard Hansen, Asger Lunde, and Neil Shephard, 2009, Realized kernels in practice: Trades and quotes, .

Bauer, Michael D, and Eric T Swanson, 2023, A reassessment of monetary policy surprises and high-frequency identification, *NBER Macroeconomics Annual* 37, 87–155.

Ben-Rephael, Azi, Bruce I Carlin, Zhi Da, and Ryan D Israelsen, 2021, Information consumption and asset pricing, *The Journal of Finance* 76, 357–394.

Boguth, Oliver, Adlai J Fisher, Vincent Grégoire, and Charles Martineau, 2023, Noisy FOMC Returns? Information, Price Pressure, and Post-Announcement Reversals, *SSRN Electronic Journal* Available at SSRN 4131740.

Bollerslev, Tim, Tzuo Hann Law, and George Tauchen, 2008, Risk, jumps, and diversification, *Journal of Econometrics* 144, 234–256.

Bonsall, Samuel B, Zahn Bozanic, and Paul E Fischer, 2013, What Do Management Earnings Forecasts Convey About the Macroeconomy?, *Journal of Accounting Research* 51, 225–266.

Chari, V V, Ravi Jagannathan, and Aharon R Ofer, 1988, Seasonalities in security returns: The case of earnings announcements, *Journal of Financial Economics* 21, 101–121.

Chava, Sudheer, and Alex Hsu, 2020, Financial constraints, monetary policy shocks, and the cross-section of equity returns, *The Review of Financial Studies* 33, 4367–4402.

Cieslak, Anna, Adair Morse, and Annette Vissing-Jorgensen, 2019, Stock returns over the FOMC cycle, *The Journal of Finance* 74, 2201–2248.

Cohen, Daniel A, Aiyesha Dey, Thomas Lys, and Shyam Sunder, 2007, Earnings Announcement Premia and the Limits to Arbitrage, *Journal of Accounting and Economics* 43, 153–180.

Croce, Mariano M., Tatyana Marchuk, and Christian Schlag, 2023, The Leading Premium, *The Review of Financial Studies* 36, 2997–3033.

DellaVigna, Stefano, and Joshua M Pollet, 2009, Investor inattention and Friday earnings announcements, *The Journal of Finance* 64, 709–749.

Drake, Michael S., Darren T. Roulstone, and Jacob R. Thornock, 2012, Investor Information Demand: Evidence from Google Searches Around Earnings Announcements, *Journal of Accounting Research* 50, 1001–1040.

Duffie, Darrell, and Larry G. Epstein, 1992, Asset Pricing with Stochastic Differential Utility, *Review of Financial Studies* 5, 411–436.

Epps, Thomas W, 1979, Comovements in stock prices in the very short run, *Journal of the American Statistical Association* 74, 291–298.

Ferracuti, Elia, and Gary Lind, 2026, Macroeconomic Information Acquisition Around Earnings Clusters, *Journal of Accounting Research* 64, 721–761.

Fisher, Adlai, Charles Martineau, and Jinfei Sheng, 2022, Macroeconomic Attention and Announcement Risk Premia, *Review of Financial Studies* 35, 5057–5093.

Frazzini, Andrea, and Owen A Lamont, 2007, The earnings announcement premium and trading volume, *NBER working paper*.

Gao, Chao, Grace Xing Hu, and Xiaoyan Zhang, 2026, Uncertainty Risk Resolution Before Earnings Announcements, *Management Science* 72, 1835–1857.

Hasler, Michael, and Charles Martineau, 2024, Equity return predictability with the ICAPM, *The Review of Asset Pricing Studies* 14, 481–512.

Hirshleifer, David, and Jinfei Sheng, 2022, Macro news and micro news: Complements or substitutes?, *Journal of Financial Economics* 145, 1006–1024.

Holden, Craig W, and Stacey Jacobsen, 2014, Liquidity measurement problems in fast, competitive markets: Expensive and cheap solutions, *The Journal of Finance* 69, 1747–1785.

Hsu, Alex, Indrajit Mitra, Yu Xu, and Linghang Zeng, 2025, The Fed Information Effect and Firm Investment, Available at SSRN 4451789.

Hu, Grace Xing, Jun Pan, Jiang Wang, and Haoxiang Zhu, 2022, Premium for heightened uncertainty: Explaining pre-announcement market returns, *Journal of Financial Economics* 145, 909–936.

Jarociński, Marek, and Peter Karadi, 2020, Deconstructing monetary policy surprises—the role of information shocks, *American Economic Journal: Macroeconomics* 12, 1–43.

Liptser, Robert S, and Albert N Shiryaev, 2001, *Statistics of Random Processes I: General Theory* vol. 6. (Springer Berlin) 2nd edn.

Lucca, David O, and Emanuel Moench, 2015, The pre-FOMC announcement drift, *The Journal of Finance* 70, 329–371.

Martineau, Charles, 2022, Rest in Peace Post-Earnings Announcement Drift, *Critical Finance Review* 11, 613–646.

Mueller, Philippe, Alireza Tahbaz-Salehi, and Andrea Vedolin, 2017, Exchange rates and monetary policy uncertainty, *The Journal of Finance* 72, 1213–1252.

Ozdagli, Ali K, 2018, Financial frictions and the stock price reaction to monetary policy, *The Review of Financial Studies* 31, 3895–3936.

Patton, Andrew J, and Michela Verardo, 2012, Does beta move with news? Firm-specific information flows and learning about profitability, *The Review of Financial Studies* 25, 2789–2839.

Peng, Lin, and Wei Xiong, 2006, Investor Attention, Overconfidence and Category Learning, *Journal of Financial Economics* 80, 563–602.

Sammon, Marco, 2025, Passive Ownership and Price Informativeness, *Management Science* 71, 4582–4598.

Savor, Pavel, and Mungo Wilson, 2013, How much do investors care about macroeconomic risk? Evidence from scheduled economic announcements, *Journal of Financial and Quantitative Analysis* 48, 343–375.

Savor, Pavel, and Mungo Wilson, 2014, Asset pricing: A tale of two days, *Journal of Financial Economics* 113, 171–201.

Savor, Pavel, and Mungo Wilson, 2016, Earnings announcements and systematic risk, *The Journal of Finance* 71, 83–138.

Todorov, Viktor, and Tim Bollerslev, 2010, Jumps and betas: A new framework for disentangling and estimating systematic risks, *Journal of Econometrics* 157, 220–235.

Wachter, Jessica A, and Yicheng Zhu, 2022, A model of two days: Discrete news and asset prices, *The Review of Financial Studies* 35, 2246–2307.

Welch, Ivo, and Amit Goyal, 2008, A comprehensive look at the empirical performance of equity premium prediction, *The Review of Financial Studies* 21, 1455–1508.

Appendix A: Model Solutions

A.1 Investors' Learning Problems

Learning between announcements This section summarizes how investors update their beliefs about the aggregate component of expected cash flow growth, θ_t, and the firm-specific components $g_{i,t}$. The learning problem is solved using a standard Kalman-Bucy filter. Applying Theorem 10.3 in Liptser and Shiryaev (2001), we characterize the resulting belief dynamics in the following lemma.

Lemma A.1. *In the interior between announcements, $t \in (0, \tau)$, investors update their beliefs based on observed consumption and dividend processes using a standard Kalman-Bucy filter. The posterior means evolve according to*

$$d\hat{\theta}_t = a\left(\bar{\theta} - \hat{\theta}_t\right) dt + \frac{q_{\theta\theta}(t)}{\sigma_C} d\hat{B}_{C,t}, \tag{A.1}$$

$$d\hat{g}_{i,t} = b\left(\bar{g} - \hat{g}_{i,t}\right) dt + \frac{q_{ii}(t)}{\sigma_D} d\hat{B}_{D_i,t}, \tag{A.2}$$

where $d\hat{B}_{C,t} = \frac{1}{\sigma_C}\left(\frac{dC_t}{C_t} - \hat{\theta}_t dt\right)$ and $d\hat{B}_{D_i,t} = \frac{1}{\sigma_D}\left(\frac{dD_{i,t}}{D_{i,t}} - \left(\hat{\theta}_t + \hat{g}_{i,t}\right) dt - \sigma_C d\hat{B}_{C,t} - \sigma_u dB_{u,t}\right)$ are innovations in the consumption growth rate and the firm-specific component of dividend growth. The posterior variances satisfy the Riccati equations:

$$dq_{\theta\theta}(t) = \left[\sigma_\theta^2 - 2aq_{\theta\theta}(t) - \frac{q_{\theta\theta}^2(t)}{\sigma_C^2}\right] dt, \tag{A.3}$$

$$dq_{ii}(t) = \left[\sigma_g^2 - 2bq_{ii}(t) - \frac{q_{ii}^2(t)}{\sigma_D^2}\right] dt. \tag{A.4}$$

Proof. Note that in general, absent a fully revealing MA, belief dynamics involve time-varying covariances. For exposition, consider first the one-firm case. The posterior means and variances satisfy

$$d\hat{\theta}_t = a\left(\bar{\theta} - \hat{\theta}_t\right) dt + \frac{q_{\theta\theta}(t)}{\sigma_C} d\hat{B}_{C,t} + \frac{q_{\theta g}(t)}{\sigma_D} d\hat{B}_{D,t},$$

$$d\hat{g}_t = b\left(\bar{g} - \hat{g}_t\right) dt + \frac{q_{\theta g}(t)}{\sigma_C} d\hat{B}_{C,t} + \frac{q_{ii}(t)}{\sigma_D} d\hat{B}_{D,t},$$

$$dq_{\theta\theta}(t) = \left[\sigma_\theta^2 - 2aq_{\theta\theta}(t) - \left(\frac{q_{\theta\theta}^2(t)}{\sigma_C^2} + \frac{q_{\theta g}^2(t)}{\sigma_D^2}\right)\right]dt, \tag{A.5}$$

$$dq_{\theta g}(t) = -\left[(a+b)\,q_{\theta g}(t) + q_{\theta g}(t)\left(\frac{q_{\theta\theta}(t)}{\sigma_C^2} + \frac{q_{ii}(t)}{\sigma_D^2}\right)\right]dt, \tag{A.6}$$

$$dq_{ii}(t) = \left[\sigma_g^2 - 2bq_{ii}(t) - \left(\frac{q_{\theta g}^2(t)}{\sigma_C^2} + \frac{q_{ii}^2(t)}{\sigma_D^2}\right)\right]dt. \tag{A.7}$$

Under the assumption that the macroeconomic announcement is fully revealing, immediately after the announcement we have $q_{\theta\theta}(T) = 0$ and $q_{\theta g}(T) = 0$. Since the cross-covariance starts from zero right after the macroeconomic announcement, its law of motion keeps it at zero between that macroeconomic announcement and the next earnings announcement; i.e., for $t \in [0, \tau)$, we have $q_{\theta g}(t) = 0$ (from Equation (A.6)). Plugging $q_{\theta g}(t) = 0$ into the system above collapses it to the simpler dynamics reported in Equations (A.1) to (A.4): investors learn separately about the aggregate component and about each firm's idiosyncratic component. Thus the only time θ and g_i get connected is at the earnings announcement, because the signals load on both. □

Earnings and macroeconomic announcements as discrete Gaussian updates The following lemma characterizes the updates to posterior moments induced by the earnings and macroeconomic announcements.

Lemma A.2. *After the earnings announcement at time τ, the posterior means for θ and g_i are*

$$\hat{\theta}^+(\tau) = (1 - \omega(\tau))\,\hat{\theta}^-(\tau) + \omega(\tau) z_\Sigma(\tau), \tag{A.8}$$

$$\hat{g}_i^+(\tau) = (1 - \alpha_i(\tau))\,\hat{g}_i^-(\tau) + \alpha_i(\tau)\left(s_{E,i}(\tau) - \hat{\theta}^+(\tau)\right), \tag{A.9}$$

where $z_\Sigma(\tau) \equiv \frac{1}{\bar{s}_\Sigma}\sum_{j=1}^N v_j(\tau)\left(s_{E,j}(\tau) - \hat{g}_j^-(\tau)\right)$ is the precision-weighted average aggregate signal, $\omega(\tau) \equiv \bar{s}_\Sigma\, q_{\theta\theta}^+(\tau)$ is its weight, and $\bar{s}_\Sigma \equiv \sum_{i=1}^N v_i(\tau)$, $v_i(\tau) \equiv [\,q_{ii}^-(\tau) + \sigma_{E,i}^2(\tau)\,]^{-1}$.

The posterior variance for the common factor θ, the posterior variance for the idiosyncratic component g_i, the cross-firm covariances, and the common-idiosyncratic covariances of g_i with θ

are

$$q^+_{\theta\theta}(\tau) = \frac{q^-_{\theta\theta}(\tau)}{1+q^-_{\theta\theta}(\tau)\bar{s}_\Sigma}, \tag{A.10}$$

$$q^+_{ii}(\tau) = q^-_{ii}(\tau)(1-\alpha_i(\tau)) + \alpha_i^2(\tau)q^+_{\theta\theta}(\tau), \tag{A.11}$$

$$q^+_{ij}(\tau) = \alpha_i(\tau)\alpha_j(\tau)q^+_{\theta\theta}(\tau), \tag{A.12}$$

$$q^+_{\theta g_i}(\tau) = -\alpha_i(\tau)q^+_{\theta\theta}(\tau). \tag{A.13}$$

At the macroeconomic announcement T (immediately after earnings, so $T^- = \tau^+$), the aggregate posterior mean jumps to $\hat{\theta}^+(T) = \theta_T$, and the firm's belief revision follows

$$\hat{g}^+_i(T) - \hat{g}^+_i(\tau) = -\alpha_i(\tau)\left(\theta_T - \hat{\theta}^+(\tau)\right), \tag{A.14}$$

and the posterior variances satisfy

$$q^+_{\theta\theta}(T) = 0, \quad q^+_{ii}(T) = q^-_{ii}(\tau)(1-\alpha_i(\tau)) = \frac{q^-_{ii}(\tau)\sigma^2_{E,i}(\tau)}{q^-_{ii}(\tau)+\sigma^2_{E,i}(\tau)}, \tag{A.15}$$

and the covariances are $q^+_{\theta g_i}(T) = 0$, $q^+_{ij}(T) = 0$ for $i \neq j$.

Proof. At the earnings announcement time τ, investors observe for each firm i a noisy signal of θ_τ and $g_{i,\tau}$. Stack the latent state before the EA as

$$x = \begin{bmatrix} \theta_\tau \\ g_{1,\tau} \\ \vdots \\ g_{N,\tau} \end{bmatrix}, \qquad \mu^-_x = \begin{bmatrix} \hat{\theta}^-_\tau \\ \hat{g}^-_{1,\tau} \\ \vdots \\ \hat{g}^-_{N,\tau} \end{bmatrix}, \qquad \Sigma^-_{xx} = \begin{bmatrix} q^-_{\theta\theta}(\tau) & 0 & \cdots & 0 \\ 0 & q^-_{11}(\tau) & & 0 \\ \vdots & & \ddots & \vdots \\ 0 & 0 & \cdots & q^-_{NN}(\tau) \end{bmatrix}.$$

Stack the N EA signals as

$$y = \begin{bmatrix} s_{E,1} \\ \vdots \\ s_{E,N} \end{bmatrix} = \underbrace{\begin{bmatrix} 1 & 1 & 0 & \cdots & 0 \\ 1 & 0 & 1 & \cdots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & 0 & 0 & \cdots & 1 \end{bmatrix}}_{=:W} x + \epsilon, \quad \epsilon \sim \mathcal{N}\big(0, \Sigma_E\big),$$

with $\Sigma_E = \mathrm{diag}(\sigma^2_{E,1}, \ldots, \sigma^2_{E,N})$. Equivalently, W says: "the i-th signal loads on θ and on g_i, but not on any other firm's g_j." Because (x, y) is jointly Gaussian, the posterior distribution of x conditional on y is again Gaussian. To apply the Gaussian conditioning formula, first form the two covariance blocks

$$\Sigma^-_{xy} = \Sigma^-_{xx} W^\top, \quad \Sigma^-_{yy} = W \Sigma^-_{xx} W^\top + \Sigma_E.$$

Given our diagonal Σ^-_{xx}, these take the explicit form

$$\Sigma^-_{xy} = \begin{bmatrix} q^-_{\theta\theta} & \cdots & q^-_{\theta\theta} \\ q^-_{11} & & 0 \\ \vdots & \ddots & \vdots \\ 0 & & q^-_{NN} \end{bmatrix}, \quad \Sigma^-_{yy} = q^-_{\theta\theta} \mathbf{1}\mathbf{1}^\top + \mathrm{diag}(d_1, \ldots, d_N),$$

where $d_i \equiv q^-_{ii} + \sigma^2_{E,i}$. The matrix Σ^-_{xy} captures how the latent state comoves with the EA signals, and Σ^-_{yy} is the covariance matrix of the EA signals themselves (the part coming from the latent state plus the EA noise).

Then the posterior mean and covariance are

$$\mu^+_x = \mu^-_x + K(y - W\mu^-_x), \qquad \Sigma^+_{xx} = \Sigma^-_{xx} - KW\Sigma^-_{xx},$$

where the Kalman gain is

$$K \equiv \Sigma^-_{xy} (\Sigma^-_{yy})^{-1}. \tag{A.16}$$

The term $z \equiv y - W\mu_x^-$ is the vector of EA surprises, i.e.,

$$z_i = s_{E,i} - (\hat{\theta}_\tau^- + \hat{g}_{i,\tau}^-). \tag{A.17}$$

That is, its elements are the actual signals minus their model-implied means. The Kalman gain tells us how strongly each surprise should move each component of the state. Now we only need to invert Σ_{yy}^-. This matrix has the special form of "diagonal part + rank-one part":

$$\Sigma_{yy}^- = \underbrace{\text{diag}(d_1, \ldots, d_N)}_{=:A} + \underbrace{q_{\theta\theta}^- \mathbf{1}\mathbf{1}^\top}_{\text{rank one}},$$

so we can apply the following Sherman-Morrison formula to compute the inverse and therefore the Kalman gain.

Theorem. *(The Sherman-Morrison formula) If A is an invertible $n \times n$ matrix and u, w are $n \times 1$ column vectors, then*

$$(A + uw^\top)^{-1} = A^{-1} - \frac{A^{-1}uw^\top A^{-1}}{1 + w^\top A^{-1}u}, \tag{A.18}$$

provided that $1 + w^\top A^{-1}u \neq 0$.

Let

$$v_i \equiv \frac{1}{d_i}, \qquad \bar{s}_\Sigma \equiv \sum_{i=1}^N v_i, \qquad V \equiv \text{diag}(v_1, \ldots, v_N).$$

Apply the theorem with $A = \text{diag}(d_1, \ldots, d_N)$, $u = \sqrt{q_{\theta\theta}^-}\mathbf{1}$, and $w^\top = \sqrt{q_{\theta\theta}^-}\mathbf{1}^\top$. Therefore, $A^{-1} = V = \text{diag}(v_1, \ldots, v_N)$.

$$w^\top A^{-1}u = \left(\sqrt{q_{\theta\theta}^-}\mathbf{1}^\top\right) V \left(\sqrt{q_{\theta\theta}^-}\mathbf{1}\right) = q_{\theta\theta}^- \mathbf{1}^\top V \mathbf{1} = q_{\theta\theta}^- \sum_{i=1}^N v_i = q_{\theta\theta}^- \bar{s}_\Sigma,$$

and

$$A^{-1}uw^\top A^{-1} = V\left(\sqrt{q_{\theta\theta}^-}\mathbf{1}\right)\left(\sqrt{q_{\theta\theta}^-}\mathbf{1}^\top\right)V = q_{\theta\theta}^- V\mathbf{1}\mathbf{1}^\top V.$$

Finally,

$$\left(\Sigma_{yy}^{-}\right)^{-1} = V - \frac{q_{\theta\theta}^{-} V \mathbf{1}\mathbf{1}^{\top} V}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}}.$$

Substituting this back into (A.16) and multiplying out (row by row) gives the following elementwise inverse, which is what we actually use:

$$\left(\Sigma_{yy}^{-}\right)^{-1}{}_{ij} = \underbrace{v_i \mathbf{1}\{i=j\}}_{\text{diag}(v)} - \frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}} v_i v_j,$$

where the diagonal element is $\left(\Sigma_{yy}^{-}\right)_{ii}^{-1} = v_i - \frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}} v_i^2$, and the off-diagonal element is $\left(\Sigma_{yy}^{-}\right)_{ij}^{-1} = -\frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}} v_i v_j$ for $i \neq j$.

Therefore, the Kalman gain is

$$K = \Sigma_{xy}^{-} \left(V - \frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}} V \mathbf{1}\mathbf{1}^{\top} V \right).$$

Finally, the Kalman gain can be summarized as

$$K_{1i} = \frac{q_{\theta\theta}^{-} v_i}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}}, \qquad K_{i+1,j} = \begin{cases} q_{ii}^{-} v_i - \frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}} q_{ii}^{-} v_i v_j, & j = i \\ -\frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}} q_{ii}^{-} v_i v_j, & j \neq i \end{cases}, \tag{A.19}$$

where K_{1i} is the gain for the common component (first row), and $K_{i+1,j}$ is the gain for firm i's idiosyncratic component ($(i+1)$-th row).

EA posterior means

For the common component, the update is

$$\Delta\hat{\theta}(\tau) = \hat{\theta}_{\tau}^{+} - \hat{\theta}_{\tau}^{-} = \sum_{i=1}^{N} K_{1i} z_i = \frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} \bar{s}_{\Sigma}} \sum_{i=1}^{N} v_i z_i. \tag{A.20}$$

Substituting $z_i = \left(s_{E,i} - \hat{g}_{i,\tau}^{-}\right) - \hat{\theta}_{\tau}^{-}$ gives $\sum_{i=1}^{N} v_i z_i = \bar{s}_{\Sigma} \left(z_{\Sigma}(\tau) - \hat{\theta}_{\tau}^{-}\right)$, so the update takes the

convex form stated in the lemma:

$$\hat{\theta}_\tau^+ = (1-\omega(\tau))\,\hat{\theta}_\tau^- + \omega(\tau) z_\Sigma(\tau), \qquad \omega(\tau) \equiv \frac{q_{\theta\theta}^- \bar{s}_\Sigma}{1+q_{\theta\theta}^- \bar{s}_\Sigma} = \bar{s}_\Sigma q_{\theta\theta}^+(\tau),$$

where the average aggregate signal $z_\Sigma(\tau) \equiv \frac{1}{\bar{s}_\Sigma}\sum_{j=1}^N v_j(\tau)\left(s_{E,j}(\tau) - \hat{g}_j^-(\tau)\right)$ pools the individual earnings signals about the common component θ with precision weights $v_i(\tau) \equiv [\, q_{ii}^-(\tau) + \sigma_{E,i}^2(\tau)\,]^{-1}$ and total precision $\bar{s}_\Sigma \equiv \sum_{i=1}^N v_i(\tau)$. In general, $\bar{s}_\Sigma$ is history dependent because it depends on all past firm-level variances $\{q_{ii}^-(\tau)\}_{i=1}^N$. Our random permutation assumption allows this dependence to be summarized by a stationary, permutation-invariant aggregator $\bar{s}_\Sigma$ (see Appendix C.3 for details). The weight on the pooled signal, $\omega(\tau) \equiv \bar{s}_\Sigma\, q_{\theta\theta}^+(\tau) = 1 - \frac{q_{\theta\theta}^+(\tau)}{q_{\theta\theta}^-(\tau)} \in [0,1)$, is the fraction of prior aggregate uncertainty resolved by the earnings announcement, where $q_{\theta\theta}^+(\tau) = (1-\omega(\tau))\, q_{\theta\theta}^-(\tau)$ is the posterior variance after pooling.

For each idiosyncratic component g_i, start from the general expression

$$\Delta\hat{g}_i(\tau) = \hat{g}_{i,\tau}^+ - \hat{g}_{i,\tau}^- \;=\; \sum_{j=1}^N K_{i+1,j} z_j = q_{ii}^- v_i z_i - \frac{q_{\theta\theta}^-}{1+q_{\theta\theta}^-\bar{s}_\Sigma} q_{ii}^- v_i \sum_{j=1}^N v_j z_j.$$

Factoring out $q_{ii}^- v_i$, defining the informativeness index

$$\alpha_i \equiv q_{ii}^- v_i = \frac{q_{ii}^-}{q_{ii}^- + \sigma_{E,i}^2} \in [0,1], \tag{A.21}$$

and using Equation (A.20) for the common update, we get the compact form

$$\Delta\hat{g}_i(\tau) = \alpha_i z_i - \alpha_i \frac{q_{\theta\theta}^-}{1+q_{\theta\theta}^-\bar{s}_\Sigma}\sum_{j=1}^N v_j z_j = \alpha_i z_i - \alpha_i \Delta\hat{\theta}(\tau). \tag{A.22}$$

Substituting $z_i = \left(s_{E,i} - \hat{g}_{i,\tau}^-\right) - \hat{\theta}_\tau^-$ and rearranging yields the lemma's convex form:

$$\hat{g}_{i,\tau}^+ = (1-\alpha_i)\,\hat{g}_{i,\tau}^- + \alpha_i\left(s_{E,i} - \hat{\theta}_\tau^+\right). \tag{A.23}$$

The residual $s_{E,i} - \hat{\theta}_\tau^+$ is a direct signal of g_i: the announcement reveals only the sum $\theta + g_i$, so

investors credit the firm with only the portion of the earnings news not attributed to the common component. Because $\hat{\theta}_\tau^+$ pools the information in all N earnings announcements, the more precise firm i's signal is (the larger α_i), the more heavily it is used to pin down θ, and the more of the earnings news is reattributed to the common component rather than to the firm.

EA posterior covariance

The posterior covariance is updated by

$$\Sigma_{xx}^+ = \Sigma_{xx}^- - \Sigma_{xy}^-(\Sigma_{yy}^-)^{-1}(\Sigma_{xy}^-)^\top,$$

and, using the inverse derived above, each block takes a simple form.

Common-factor posterior variance:

$$q_{\theta\theta}^+(\tau) = q_{\theta\theta}^- - \frac{(q_{\theta\theta}^-)^2 \bar{s}_\Sigma}{1 + q_{\theta\theta}^- \bar{s}_\Sigma} = \frac{q_{\theta\theta}^-}{1 + q_{\theta\theta}^- \bar{s}_\Sigma}. \tag{A.24}$$

Equivalently, $q_{\theta\theta}^+(\tau) = (1 - \omega(\tau))\, q_{\theta\theta}^-(\tau)$: the announcement wave resolves the fraction $\omega(\tau)$ of prior aggregate uncertainty.

Cross-firm covariances (for $i \neq j$):

$$q_{ij}^+(\tau) = \frac{q_{\theta\theta}^-}{1 + q_{\theta\theta}^- \bar{s}_\Sigma} q_{ii}^- q_{jj}^- v_i v_j = \alpha_i \alpha_j q_{\theta\theta}^+ \geq 0. \tag{A.25}$$

After the earnings announcement, firms' idiosyncratic components become positively correlated because residual uncertainty about the aggregate component θ induces comovement across firms. This remaining aggregate uncertainty, of magnitude $q_{\theta\theta}^+$, loads onto firm-level beliefs in proportion to $\alpha_i \alpha_j$, implying positive cross-firm covariance $q_{ij}^+ \geq 0$.

Idiosyncratic variances:

$$q_{ii}^+(\tau) = q_{ii}^- - (q_{ii}^-)^2 \left(v_i - \frac{q_{\theta\theta}^-}{1 + q_{\theta\theta}^- \bar{s}_\Sigma} v_i^2 \right) = q_{ii}^-(1 - \alpha_i) + \alpha_i^2 q_{\theta\theta}^+. \tag{A.26}$$

This equation shows that learning from firm i's own EA reduces the first component of its idiosyncratic variance to $q_{ii}^-(1 - \alpha_i)$, while residual uncertainty about θ adds $\alpha_i^2 q_{\theta\theta}^+$. Since the EA

mixes common and firm-specific news, residual uncertainty about θ "leaks" into g_i. In limiting cases, if all EAs are very precise or if numerous firms announce earnings, $q^+_{\theta\theta} \to 0$; if a firm's EA is uninformative ($\alpha_i \to 0$), then $q^+_{ii} \approx q^-_{ii}$ and the EA barely changes beliefs about that firm.

Common-idiosyncratic covariances:

$$q^+_{\theta g_i}(\tau) = -\frac{q^-_{\theta\theta}}{1 + q^-_{\theta\theta}\bar{s}_\Sigma} q^-_{ii} v_i = -\alpha_i q^+_{\theta\theta} \leq 0. \tag{A.27}$$

Thus, after the EA, each firm's idiosyncratic component is negatively correlated with the common component.

Collecting these entries, the posterior covariance matrix takes the compact form:

$$\Sigma^+_{xx} = \begin{bmatrix} q^+_{\theta\theta} & -\alpha_1 q^+_{\theta\theta} & \cdots & -\alpha_N q^+_{\theta\theta} \\ -\alpha_1 q^+_{\theta\theta} & q^-_{11}(1-\alpha_1) + \alpha_1^2 q^+_{\theta\theta} & \cdots & \alpha_1\alpha_N q^+_{\theta\theta} \\ \vdots & \vdots & \ddots & \vdots \\ -\alpha_N q^+_{\theta\theta} & \alpha_N\alpha_1 q^+_{\theta\theta} & \cdots & q^-_{NN}(1-\alpha_N) + \alpha_N^2 q^+_{\theta\theta} \end{bmatrix}.$$

Immediate macro (fully revealing) right after the EAs

Let $T^- = \tau^+$. Because the macro announcement reveals θ_T exactly, the conditional Gaussian projection gives

$$\hat{\theta}^+_T = \theta_T, \qquad \hat{g}^+_i(T) = \hat{g}^+_i(\tau) + \frac{q^+_{\theta g_i}(\tau)}{q^+_{\theta\theta}(\tau)}\big(\theta_T - \hat{\theta}^+_\tau\big) = \hat{g}^+_i(\tau) - \alpha_i(\tau)\big(\theta_T - \hat{\theta}^+_\tau\big), \tag{A.28}$$

where the last equality uses $q^+_{\theta g_i}(\tau) = -\alpha_i(\tau) q^+_{\theta\theta}(\tau)$. Thus, any remaining surprise about θ after the EAs, $\theta_T - \hat{\theta}^+_\tau$, is stripped out of firm i's idiosyncratic component in proportion to its EA loading $\alpha_i(\tau)$.

A fully revealing macro announcement sets the common uncertainty to zero and removes all comovement generated by θ:

$$q^+_{\theta\theta}(T) = 0, \quad q^+_{\theta g_i}(T) = 0, \quad q^+_{ij}(T) = 0 \ (i \neq j).$$

For the idiosyncratic covariance block, apply the standard Gaussian projection step:

$$\Sigma_{ij}(T) = \Sigma_{ij}(\tau) - \Sigma_{g_i\theta}(\tau)\big(q^+_{\theta\theta}(\tau)\big)^{-1}\Sigma_{\theta g_j}(\tau).$$

Elementwise, this gives, for $i \neq j$,

$$q^+_{ij}(T) = q^+_{ij}(\tau) - \frac{q^+_{\theta g_i}(\tau)\, q^+_{\theta g_j}(\tau)}{q^+_{\theta\theta}(\tau)} = \alpha_i(\tau)\alpha_j(\tau)q^+_{\theta\theta}(\tau) - \frac{\big(-\alpha_i(\tau)q^+_{\theta\theta}(\tau)\big)\big(-\alpha_j(\tau)q^+_{\theta\theta}(\tau)\big)}{q^+_{\theta\theta}(\tau)} = 0,$$

and, for the diagonals,

$$q^+_{ii}(T) = q^+_{ii}(\tau) - \frac{\big(q^+_{\theta g_i}(\tau)\big)^2}{q^+_{\theta\theta}(\tau)} = q^-_{ii}(\tau)(1-\alpha_i(\tau)) = \frac{q^-_{ii}(\tau)\sigma^2_{E,i}(\tau)}{q^-_{ii}(\tau)+\sigma^2_{E,i}(\tau)}.$$

Thus, immediately after the macro announcement, all EA-induced comovement vanishes, and each firm is left only with its own EA residual variance. □

Proof of Proposition 1 We have just shown that, after the earnings announcement τ, the conditional common-idiosyncratic covariance is negative,

$$\mathrm{Cov}\left(\theta_\tau, g_{i,\tau} \middle| y\right) \equiv q^+_{\theta g_i}(\tau) = -\alpha_i(\tau)q^+_{\theta\theta}(\tau) \leq 0. \tag{A.29}$$

By the law of total covariance, the expected conditional covariance and the covariance of conditional expectations must sum to the unconditional covariance $q^-_{\theta g_i}(\tau)$, which is zero. Hence, after the EA,

$$\mathrm{Cov}_{\tau^-}\left(\hat\theta^+_\tau, \hat g^+_{i,\tau}\right) = -\mathbb{E}_{\tau^-}\left[q^+_{\theta g_i}(\tau)\right] = \alpha_i(\tau)q^+_{\theta\theta}(\tau) \geq 0. \tag{A.30}$$

At the macro announcement, with $T^- = \tau^+$, the remaining aggregate surprise has variance $\mathrm{Var}_{T^-}\left(\theta_T - \hat\theta^+_\tau\right) = q^+_{\theta\theta}(\tau)$. Therefore, Equation (A.28) implies

$$\mathrm{Cov}_{T^-}\left(\hat\theta^+_T, \hat g^+_{i,T}\right) = q^+_{\theta g_i}(\tau) = -\alpha_i(\tau)q^+_{\theta\theta}(\tau) \leq 0. \tag{A.31}$$

Finally, since $\alpha_i(\tau) = \dfrac{q_{ii}^-(\tau)}{q_{ii}^-(\tau) + \sigma_{E,i}^2(\tau)}$, holding other objects fixed, the comparative statics with respect to firm i's EA noise satisfy

$$\frac{d\mathrm{Cov}_{\tau^-}\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+\right)}{d\sigma_{E,i}^2(\tau)} \leq 0, \qquad \frac{d\mathrm{Cov}_{T^-}\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+\right)}{d\sigma_{E,i}^2(\tau)} \geq 0. \tag{A.32}$$

The inequalities are strict whenever $\sigma_{E,i}^2(\tau) < \infty$, i.e., $\alpha_i(\tau) > 0$.

A.2 The Value Function of the Representative Agent

In this subsection, we derive the solution for the value function and the associated boundary conditions at the earnings and macroeconomic announcements.

Using the results from Duffie and Epstein (1992), the representative agent's preferences are specified by a pair of aggregators $(f, \mathcal{A})$ such that the utility of the representative agent, V_t, is the solution to the following SDE:

$$dV_t = [-f(C_t, V_t) - \frac{1}{2}\mathcal{A}(V_t)||\sigma_V(t)||^2]dt + \sigma_V(t)dB_t, \tag{A.33}$$

for a square-integrable process $\sigma_V(t)$. We adopt the convenient normalization $\mathcal{A}(V_t) = 0$ as in Duffie and Epstein (1992), and denote by $\bar{f}$ the normalized aggregator. Under this normalization, for $\psi \neq 1$, $\bar{f}(C_t, V_t)$ is defined as

$$\bar{f}(C_t, V_t) = \frac{\rho}{1 - 1/\psi} \frac{C_t^{1-1/\psi} - \left((1-\gamma)\, V_t\right)^{\frac{1-1/\psi}{1-\gamma}}}{\left((1-\gamma)\, V_t\right)^{\frac{1-1/\psi}{1-\gamma} - 1}}. \tag{A.34}$$

The Hamilton-Jacobi-Bellman (HJB) equation for recursive utility is

$$\bar{f}\left(C_t, V\left(\hat{\theta}, t, C_t\right)\right) + \mathcal{L}\left[V\left(\hat{\theta}, t, C_t\right)\right] = 0, \tag{A.35}$$

where $\mathcal{L}$ is the infinitesimal generator defined as $\mathcal{L}\left(V_t\right) = \lim_{\Delta \to 0} \frac{1}{\Delta}\mathbb{E}_t\left[V_{t+\Delta} - V_t\right]$. Consider the

following homogeneous form for the value function:

$$V\left(\hat{\theta}_t, t, C_t\right) = \frac{1}{1-\gamma} H\left(\hat{\theta}_t, t\right) C_t^{1-\gamma}, \tag{A.36}$$

where

$$\frac{dC_t}{C_t} = \hat{\theta}_t dt + \sigma_C d\hat{B}_{C,t} \tag{A.37}$$

$$d\hat{\theta}_t = a\left(\bar{\theta} - \hat{\theta}_t\right) dt + \frac{q_{\theta\theta}(t)}{\sigma_C} d\hat{B}_{C,t}. \tag{A.38}$$

The following lemma summarizes the solution for the value function, with details on the numerical solution available in Appendix C.1.

Lemma A.3. *In the interior* $(0, \tau)$*,* $H\left(\hat{\theta}_t, t\right)$ *satisfies the following HJB equation*

$$\begin{aligned} 0 = & \frac{1}{H(1-\gamma)}\left\{H_t + H_\theta\left[a\left(\bar{\theta} - \hat{\theta}_t\right) + (1-\gamma) q_{\theta\theta}\right] + \frac{1}{2} H_{\theta\theta} \frac{q_{\theta\theta}^2}{\sigma_C^2}\right\} \\ & + \frac{\rho}{1-\frac{1}{\psi}}\left(H^{-\frac{1-\frac{1}{\psi}}{1-\gamma}} - 1\right) + \left(\hat{\theta}_t - \frac{1}{2}\gamma\sigma_C^2\right), \end{aligned} \tag{A.39}$$

where we use the following notation: $H_t = \frac{\partial H(\hat{\theta}_t, t)}{\partial t}$*,* $H_\theta = \frac{\partial H(\hat{\theta}_t, t)}{\partial \hat{\theta}_t}$*, and* $H_{\theta\theta} = \frac{\partial^2 H(\hat{\theta}_t, t)}{\partial \hat{\theta}_t^2}$*.*

After the earnings announcement τ*, the boundary condition is*

$$H\left(\hat{\theta}_\tau^-, \tau^-\right) = \mathbb{E}\left[H\left(\hat{\theta}_\tau^+, \tau^+\right) \mid \hat{\theta}_\tau^-, \tau^-\right] = \int_{-\infty}^{+\infty} H\left(\hat{\theta}_\tau^+, \tau^+\right) \phi_1\left(\hat{\theta}_\tau^+\right) d\hat{\theta}_\tau^+, \tag{A.40}$$

where $\phi_1(\hat{\theta}_\tau^+)$ *is the density of the normal distribution and* $\hat{\theta}_\tau^+ \sim \mathcal{N}\left(\hat{\theta}_\tau^-, \frac{q_{\theta\theta}^-(\tau)^2 \bar{s}_\Sigma}{1 + q_{\theta\theta}^-(\tau)\bar{s}_\Sigma}\right)$*.*

After the macroeconomic announcement T*, where* $T^- = \tau^+$*, the boundary condition is*

$$H\left(\hat{\theta}_T^-, T^-\right) = \mathbb{E}\left[H\left(\hat{\theta}_T^+, T^+\right) \mid \hat{\theta}_T^-, T^-\right] = \int_{-\infty}^{+\infty} H\left(\hat{\theta}_T^+, T^+\right) \phi_1\left(\hat{\theta}_T^+\right) d\hat{\theta}_T^+, \tag{A.41}$$

where $\hat{\theta}_T^+ \sim \mathcal{N}\left(\hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\right)$*.*

Proof. The form of the value function implies $\bar{f}(C, V) = \frac{\rho}{1-\frac{1}{\psi}} C^{1-\gamma}\left(H^{1-\frac{1-\frac{1}{\psi}}{1-\gamma}} - H\right)$. Using Ito's

lemma, we have

$$\begin{aligned}\frac{\mathcal{L}\left[V\left(\hat{\theta}_t,t,C_t\right)\right]}{C_t^{1-\gamma}} &= \frac{\mathcal{L}\left[H\left(\hat{\theta}_t,t\right)C_t^{1-\gamma}\right]}{(1-\gamma)\,C_t^{1-\gamma}} \\ &= H\left(\hat{\theta}_t-\frac{1}{2}\gamma\sigma_C^2\right)+\frac{1}{1-\gamma}\left[H_t+H_\theta a\left(\bar{\theta}-\hat{\theta}_t\right)+\frac{1}{2}H_{\theta\theta}\frac{q_{\theta\theta}^2}{\sigma_C^2}\right]+H_\theta q_{\theta\theta}.\end{aligned}$$

Therefore, the HJB equation is written as Equation (A.39).

We have boundary conditions at both the earnings and the macroeconomic announcements. First, after the earnings announcement, the boundary condition is given by Equation (A.40), where $\hat{\theta}_\tau^+ \sim \mathcal{N}\left(\hat{\theta}_\tau^-, q_{\theta\theta}^-(\tau)-q_{\theta\theta}^+(\tau)\right)$; here, $q_{\theta\theta}^-(\tau)-q_{\theta\theta}^+(\tau)$ reflects the posterior variance drop upon the earnings announcement. With N firms announcing at τ, the posterior $q_{\theta\theta}^+(\tau)$ is $q_{\theta\theta}^+(\tau)=\frac{q_{\theta\theta}^-(\tau)}{1+q_{\theta\theta}^-(\tau)\bar{s}_\Sigma}$ from Equation (A.10). Hence the posterior variance drop is $q_{\theta\theta}^-(\tau)-q_{\theta\theta}^+(\tau)=\frac{q_{\theta\theta}^-(\tau)^2\bar{s}_\Sigma}{1+q_{\theta\theta}^-(\tau)\bar{s}_\Sigma}$.

Second, after the macroeconomic announcement at T, the boundary condition is given by Equation (A.41), where $\hat{\theta}_T^+ \sim \mathcal{N}\left(\hat{\theta}_T^-, q_{\theta\theta}^-(T)\right)$, which is equivalent to $\hat{\theta}_T^+ \sim \mathcal{N}\left(\hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\right)$ since $q_{\theta\theta}^+(T)=0$ and $T^-=\tau^+$. □

A.3 Asset Prices

In this subsection, we begin by deriving the pricing kernel for the representative agent. Following that, we derive the risk-free rate and the partial differential equation (PDE) for the price-to-dividend ratio, along with boundary conditions at both the earnings and macro announcements. Finally, we calculate the cumulative return and the risk premium.

Pricing kernel and the risk-free rate We first provide a proof of the law of motion of the pricing kernel, which satisfies the stochastic differential equation (SDE) in Equation (19), where the risk-free rate r_t and the market price of risk $\sigma_M(\hat{\theta}_t,t)$ are

$$r\left(\hat{\theta}_t,t\right) = \rho+\frac{1}{\psi}\hat{\theta}_t-\frac{\gamma\sigma_C^2}{2}\left(\frac{1}{\psi}+1\right)+\frac{\frac{1}{\psi}-\gamma}{1-\gamma}\frac{H_\theta}{H}q_{\theta\theta}+\frac{\left(\frac{1}{\psi}-\gamma\right)\left(1-\frac{1}{\psi}\right)}{2\left(1-\gamma\right)^2}\left(\frac{H_\theta}{H}\frac{q_{\theta\theta}}{\sigma_C}\right)^2 \quad \text{(A.42)}$$

$$\sigma_M\left(\hat{\theta}_t,t\right) = \gamma\sigma_C-\frac{\frac{1}{\psi}-\gamma}{1-\gamma}\frac{H_\theta}{H}\frac{q_{\theta\theta}}{\sigma_C}. \quad \text{(A.43)}$$

Here, we use the notation $\frac{H_\theta}{H} = \frac{\partial H(\hat{\theta}_t,t)/\partial \hat{\theta}_t}{H(\hat{\theta}_t,t)}$ and $\frac{H_{\theta\theta}}{H} = \frac{\partial^2 H(\hat{\theta}_t,t)/\partial \hat{\theta}_t^2}{H(\hat{\theta}_t,t)}$.

Proof. The pricing kernel is defined as

$$\frac{dM_t}{M_t} = \frac{d\bar{f}_C\left(C,V\right)}{\bar{f}_C\left(C,V\right)} + \bar{f}_V\left(C,V\right)dt, \tag{A.44}$$

where $\bar{f}_C\left(C,V\right) = \rho H^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}} C^{-\gamma}$, and $\bar{f}_V\left(C,V\right) = \rho \frac{\frac{1}{\psi}-\gamma}{1-\frac{1}{\psi}} H^{-\frac{1-\frac{1}{\psi}}{1-\gamma}} - \rho \frac{1-\gamma}{1-\frac{1}{\psi}}$. Applying Ito's lemma, we have

$$\begin{aligned}
\frac{d\bar{f}_C\left(C,V\right)}{\bar{f}_C\left(C,V\right)} &= \frac{d[H^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}} C_t^{-\gamma}]}{H^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}} C_t^{-\gamma}} = \Bigg\{ -\gamma\hat{\theta}_t + \frac{1}{2}\gamma\left(\gamma+1\right)\sigma_C^2 - \gamma\frac{\frac{1}{\psi}-\gamma}{1-\gamma}\frac{H_\theta}{H}q_{\theta\theta} \\
&\quad + \frac{\frac{1}{\psi}-\gamma}{1-\gamma}\left[\frac{H_t}{H} + \frac{H_\theta}{H}a\left(\bar{\theta}-\hat{\theta}_t\right)\right] + \frac{1}{2}\frac{\frac{1}{\psi}-\gamma}{1-\gamma}\left(\frac{\frac{1}{\psi}-1}{1-\gamma}\frac{H_\theta^2}{H^2} + \frac{H_{\theta\theta}}{H}\right)\frac{q_{\theta\theta}^2}{\sigma_C^2}\Bigg\}dt \\
&\quad + \left(-\gamma\sigma_C + \frac{\frac{1}{\psi}-\gamma}{1-\gamma}\frac{H_\theta}{H}\frac{q_{\theta\theta}}{\sigma_C}\right)d\hat{B}_{C,t}.
\end{aligned} \tag{A.45}$$

Matching the drift and diffusion terms in Equation (19), we obtain Equation (A.43) and the risk-free rate

$$\begin{aligned}
r_t &= -\frac{\frac{1}{\psi}-\gamma}{\left(1-\gamma\right)H}\left[H_t + H_\theta a\left(\bar{\theta}-\hat{\theta}_t\right) + \frac{1}{2}\left(\frac{\frac{1}{\psi}-1}{1-\gamma}\frac{H_\theta^2}{H} + H_{\theta\theta}\right)\frac{q_{\theta\theta}^2}{\sigma_C^2} - \gamma H_\theta q_{\theta\theta}\right] \\
&\quad + \gamma\hat{\theta}_t - \frac{1}{2}\gamma\left(\gamma+1\right)\sigma_C^2 - \rho\frac{\frac{1}{\psi}-\gamma}{1-\frac{1}{\psi}}H^{-\frac{1-\frac{1}{\psi}}{1-\gamma}} + \rho\frac{1-\gamma}{1-\frac{1}{\psi}}.
\end{aligned} \tag{A.46}$$

Using the HJB equation to simplify r_t by multiplying both sides of (A.39) by $\frac{1}{\psi}-\gamma$,

$$\begin{aligned}
0 &= \frac{\frac{1}{\psi}-\gamma}{H\left(1-\gamma\right)}\left\{H_t + H_\theta\left[a\left(\bar{\theta}-\hat{\theta}_t\right) + \left(1-\gamma\right)q_{\theta\theta}\right] + \frac{1}{2}H_{\theta\theta}\left(\frac{q_{\theta\theta}^2}{\sigma_C^2}\right)\right\} \\
&\quad + \frac{\rho\left(\frac{1}{\psi}-\gamma\right)}{1-\frac{1}{\psi}}\left(H^{-\frac{1-\frac{1}{\psi}}{1-\gamma}} - 1\right) + \left(\frac{1}{\psi}-\gamma\right)\left(\hat{\theta}_t - \frac{1}{2}\gamma\sigma_C^2\right),
\end{aligned}$$

and adding the result to Equation (A.46), we obtain the instantaneous risk-free rate in Equation (A.42). □

Price-to-dividend ratio The solution for the price-to-dividend ratio $p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right)$ is presented in the following lemma. Further details on numerical solutions can be found in Appendix C.2.

Lemma A.4. *In the interior $(0,\tau)$, the price-to-dividend ratio $p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)$ satisfies the following PDE:*

$$\varpi\left(\hat{\theta}_t, \hat{g}_{i,t}, t\right) p = 1 + p_t + p_\theta \varrho\left(\hat{\theta}_t, t\right) + p_g \vartheta\left(\hat{g}_{i,t}, q_{ii}, t\right) + \frac{1}{2} p_{\theta\theta} \frac{q_{\theta\theta}^2}{\sigma_C^2} + \frac{1}{2} p_{gg} \frac{q_{ii}^2}{\sigma_D^2} + p_q \zeta\left(q_{ii}\right), \quad \text{(A.47)}$$

where we use the notation $p_t = \frac{\partial p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)}{\partial t}$, $p_\theta = \frac{\partial p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)}{\partial \hat{\theta}_t}$, $p_{\theta\theta} = \frac{\partial^2 p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)}{\partial \hat{\theta}_t^2}$, $p_g = \frac{\partial p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)}{\partial \hat{g}_{i,t}}$, $p_{gg} = \frac{\partial^2 p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)}{\partial \hat{g}_{i,t}^2}$, $p_q = \frac{\partial p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)}{\partial q_{ii,t}}$, and

$$\begin{aligned}
\varpi\left(\hat{\theta}_t, \hat{g}_{i,t}, t\right) &= -\hat{g}_{i,t} - \left(1 - \frac{1}{\psi}\right)\hat{\theta}_t + \rho + \frac{1}{2}\gamma\left(1 - \frac{1}{\psi}\right)\sigma_C^2 + \frac{\left(\frac{1}{\psi} - \gamma\right)\left(1 - \frac{1}{\psi}\right)}{2\left(1-\gamma\right)^2}\left(\frac{H_\theta}{H}\frac{q_{\theta\theta}}{\sigma_C}\right)^2, \\
\varrho\left(\hat{\theta}_t, t\right) &= a\left(\bar{\theta} - \hat{\theta}_t\right) + \left(1-\gamma\right) q_{\theta\theta} + \frac{\frac{1}{\psi} - \gamma}{1-\gamma}\frac{H_\theta}{H}\frac{q_{\theta\theta}^2}{\sigma_C^2}, \\
\vartheta\left(\hat{g}_{i,t}, q_{ii}, t\right) &= b\left(\bar{g} - \hat{g}_{i,t}\right) + q_{ii}, \\
\zeta\left(q_{ii}\right) &= \sigma_g^2 - 2bq_{ii} - \frac{q_{ii}^2}{\sigma_D^2}.
\end{aligned}$$

The boundary condition at the earnings announcement τ is given by

$$p\left(\sigma_{E,i}(\tau); \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right) = \frac{\int\int e^{B\ln H\left(\hat{\theta}_\tau^+, \tau^+\right) + \ln p\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+, q_{ii,\tau}^+, \tau^+\right)} \phi\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+ \middle| \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, \Delta\Sigma_{E,i}\right) d\hat{\theta}_\tau^+ d\hat{g}_{i,\tau}^+}{\left[\int e^{\ln H\left(\hat{\theta}_\tau^+, \tau^+\right)} \phi_1\left(\hat{\theta}_\tau^+ \middle| \hat{\theta}_\tau^-, q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau)\right) d\hat{\theta}_\tau^+\right]^B}, \quad \text{(A.48)}$$

$$p\left(\hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right) = \sum_{n=1}^{N} \frac{1}{N} p\left(\sigma_{E,n}; \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right), \quad \text{(A.49)}$$

where $B = \frac{\frac{1}{\psi} - \gamma}{1-\gamma}$, $\Delta\Sigma_{E,i} = \begin{bmatrix} q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau) & \alpha_i(\tau) q_{\theta\theta}^+(\tau) \\ \alpha_i(\tau) q_{\theta\theta}^+(\tau) & \alpha_i(\tau) q_{ii}^-(\tau) - \alpha_i^2(\tau) q_{\theta\theta}^+(\tau) \end{bmatrix}$, and ϕ is the joint normal density of $\hat{\theta}$ and $\hat{g}_i$. The unconditional average applies to announcing firms, whose noise type is drawn uniformly from the N finite values; for a non-announcer the corresponding pre-announcement value is the single-type $p\left(\sigma_E \to \infty; \cdot\right)$.

The boundary condition at the macroeconomic announcement T is given by

$$
\begin{aligned}
p\left(\sigma_{E,i}(\tau);\hat{\theta}_T^-,\hat{g}_{i,T}^-,q_{ii,T}^-,T^-\right) &= \frac{\int e^{B\ln H\left(\hat{\theta}_T^+,T^+\right)+\ln p\left(\hat{\theta}_T^+,\hat{g}_{i,T}^+(\hat{\theta}_T^+),q_{ii,T}^+,T^+\right)}\phi_1\left(\hat{\theta}_T^+\middle|\,\hat{\theta}_T^-,q_{\theta\theta}^+(\tau)\right)d\hat{\theta}_T^+}{\left[\int e^{\ln H\left(\hat{\theta}_T^+,T^+\right)}\phi_1\left(\hat{\theta}_T^+\middle|\,\hat{\theta}_T^-,q_{\theta\theta}^+(\tau)\right)d\hat{\theta}_T^+\right]^B} \\
p\left(\hat{\theta}_T^-,\hat{g}_{i,T}^-,q_{ii,T}^-,T^-\right) &= \sum_{n=1}^{N}\frac{1}{N}p\left(\sigma_{E,n};\hat{\theta}_T^-,\hat{g}_{i,T}^-,q_{ii,T}^-,T^-\right),
\end{aligned}
$$

where $\hat{g}_i^+(T)=\hat{g}_i^-(T)-\alpha_i(\tau)\left(\hat{\theta}_T^+-\hat{\theta}_T^-\right)$.

Proof. The present value relationship (20) implies

$$
M_tD_{i,t}dt+\mathcal{L}\left[M_tp\left(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t\right)D_{i,t}\right]=0. \tag{A.50}
$$

This gives $\frac{\mathcal{L}\left[M_tp(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t)D_{i,t}\right]}{M_tp(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t)D_{i,t}}+\frac{1}{p(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t)}=0$. Applying Ito's lemma and using Equations (3) and (19), we have

$$
\begin{aligned}
\frac{\mathcal{L}\left[M_tp(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t)D_{i,t}\right]}{M_tp(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t)D_{i,t}} &= -r_t+\frac{1}{p}\Bigg[p_t+p_\theta a\left(\bar{\theta}-\hat{\theta}_t\right)+\frac{1}{2}p_{\theta\theta}\frac{q_{\theta\theta}^2}{\sigma_C^2}+p_g b\left(\bar{g}-\hat{g}_{i,t}\right) \\
&\quad +\frac{1}{2}p_{gg}\frac{q_{ii}^2}{\sigma_D^2}+p_q\left(\sigma_g^2-2bq_{ii}-\frac{q_{ii}^2}{\sigma_D^2}\right)\Bigg]+\left(\hat{\theta}_t+\hat{g}_{i,t}\right) && \text{(A.51)} \\
&\quad -\sigma_M\left(\sigma_C+\frac{p_\theta}{p}\frac{q_{\theta\theta}}{\sigma_C}\right)+\frac{p_\theta}{p}q_{\theta\theta}+\frac{p_g}{p}q_{ii}. && \text{(A.52)}
\end{aligned}
$$

Plugging in r_t from (A.42) gives the PDE for $p(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t)$.

We next solve the boundary conditions at both the earnings and macroeconomic announcements. In order to price the asset at the announcement, we need the announcement SDF. Another way to write Equation (A.44) is $M_t=\bar{f}_C\left(C_t,V_t\right)e^{\int_0^t\bar{f}_V(C_s,V_s)ds}$. From this formula, we can derive the macro-announcement SDF as $\frac{H(\hat{\theta}_T^+,T^+)^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}}}{\mathbb{E}\left[H(\hat{\theta}_T^+,T^+)\middle|\hat{\theta}_T^-,T^-\right]^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}}}$. The intuition is as follows. Upon the announcement, C_t is continuous while the continuation utility $H(\hat{\theta}_t,t)$ jumps when new information about $\hat{\theta}_t$ arrives because of generalized risk sensitivity in preferences (Ai and Bansal, 2018).

For an event at time $t_{\text{evt}}\in\{\tau,T\}$ and a focal firm i, the pre-event state is $(\hat{\theta}^-,\hat{g}_i^-)$. For

notational convenience, define the (event-time) variance drop

$$\Delta\Sigma_{t_{\text{evt}}} = \begin{bmatrix} \Delta q_{\theta\theta}\left(t_{\text{evt}}\right) & \Delta q_{\theta g_i}\left(t_{\text{evt}}\right) \\ \Delta q_{\theta g_i}\left(t_{\text{evt}}\right) & \Delta q_{ii}\left(t_{\text{evt}}\right) \end{bmatrix} = \begin{bmatrix} q^-_{\theta\theta}\left(t_{\text{evt}}\right) - q^+_{\theta\theta}\left(t_{\text{evt}}\right) & q^-_{\theta g_i}\left(t_{\text{evt}}\right) - q^+_{\theta g_i}\left(t_{\text{evt}}\right) \\ q^-_{\theta g_i}\left(t_{\text{evt}}\right) - q^+_{\theta g_i}\left(t_{\text{evt}}\right) & q^-_{ii}\left(t_{\text{evt}}\right) - q^+_{ii}\left(t_{\text{evt}}\right) \end{bmatrix},$$

which is positive semidefinite. Also define $B = \frac{\frac{1}{\psi}-\gamma}{1-\gamma}$. As before, denote by ϕ_1 the marginal density for $\hat{\theta}$, and further define ϕ as the joint normal density of $\hat{\theta}$ and $\hat{g}_i$.

First, we derive the boundary condition at the earnings announcement. Note that N firms simultaneously announce earnings at τ. At the earnings announcement τ, the posterior means for (θ, g_i) satisfy $\begin{pmatrix} \hat{\theta}^+(\tau) \\ \hat{g}_i^+(\tau) \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} \hat{\theta}^-(\tau) \\ \hat{g}_i^-(\tau) \end{pmatrix}, \Delta\Sigma_{E,i} \right)$. Using the boundary conditions in Equations (A.10) to (A.12), we have

$$\Delta\Sigma_{E,i} \equiv \begin{bmatrix} \Delta q_{\theta\theta}(\tau) & \Delta q_{\theta g_i}(\tau) \\ \Delta q_{\theta g_i}(\tau) & \Delta q_{ii}(\tau) \end{bmatrix} = \begin{bmatrix} q^-_{\theta\theta}(\tau) - q^+_{\theta\theta}(\tau) & \alpha_i(\tau) q^+_{\theta\theta}(\tau) \\ \alpha_i(\tau) q^+_{\theta\theta}(\tau) & \alpha_i(\tau) q^-_{ii}(\tau) - \alpha_i^2(\tau) q^+_{\theta\theta}(\tau) \end{bmatrix}. \tag{A.53}$$

Or equivalently,

$$\Delta q_{\theta\theta}(\tau) = q^-_{\theta\theta}(\tau) - q^+_{\theta\theta}(\tau) = \frac{\left(q^-_{\theta\theta}(\tau)\right)^2 \bar{s}_\Sigma}{1 + q^-_{\theta\theta}(\tau)\bar{s}_\Sigma},$$

$$\Delta q_{\theta g_i}(\tau) = q^-_{\theta g_i}(\tau) - q^+_{\theta g_i}(\tau) = 0 - \left(-\alpha_i(\tau) q^+_{\theta\theta}(\tau)\right) = \alpha_i(\tau) q^+_{\theta\theta}(\tau) = \frac{q^-_{\theta\theta}(\tau) q^-_{ii}(\tau)}{\left(1 + q^-_{\theta\theta}(\tau)\bar{s}_\Sigma\right)} v_i,$$

$$\begin{aligned} \Delta q_{ii}(\tau) &= q^-_{ii}(\tau) - q^+_{ii}(\tau) = q^-_{ii}(\tau) - \left(q^-_{ii}(\tau)(1-\alpha_i(\tau)) + \alpha_i^2(\tau) q^+_{\theta\theta}(\tau)\right) = \alpha_i(\tau) q^-_{ii}(\tau) - \alpha_i^2(\tau) q^+_{\theta\theta}(\tau) \\ &= \left(q^-_{ii}(\tau)\right)^2 \left(v_i - v_i^2 q^+_{\theta\theta}(\tau)\right) = \left(q^-_{ii}(\tau)\right)^2 v_i \left[1 - \frac{v_i q^-_{\theta\theta}(\tau)}{1 + q^-_{\theta\theta}(\tau)\bar{s}_\Sigma}\right]. \end{aligned}$$

We compute the boundary condition in two steps. Using the announcement SDF, the boundary condition at the earnings announcement τ is

$$p\left(\hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, q^-_{ii,\tau}, \tau^-\right) = \mathbb{E}\left[\frac{H\left(\hat{\theta}^+_\tau, \tau^+\right)^B p\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}, q^+_{ii,\tau}, \tau^+\right)}{\left(\mathbb{E}\left[H\left(\hat{\theta}^+_\tau, \tau^+\right) \mid \hat{\theta}^-_\tau, \tau^-\right]\right)^B} \middle| \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, q^-_{ii,\tau}, \tau^- \right].$$

Step 1. Condition on a realization of $\sigma_{E,i}(\tau)$.

On each earnings announcement day τ, we draw N values $\{\sigma_{E,1}, \ldots, \sigma_{E,N}\}$ from F_E and assign them to firms by random permutation. Investors know the distribution F_E, so they can update their beliefs about the associated distribution of $\hat{g}_i^+(\tau)$ according to Equation (A.53), conditioning on a given draw $\sigma_{E,i}(\tau)$. It is useful to denote this intermediate step as

$$\begin{aligned} p\left(\sigma_{E,i}(\tau); \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right) &= \mathbb{E}\left[\left.\frac{H\left(\hat{\theta}_\tau^+, \tau^+\right)^B p\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+, q_{ii,\tau}^+, \tau^+\right)}{\left(\mathbb{E}\left[H\left(\hat{\theta}_\tau^+, \tau^+\right) \mid \hat{\theta}_\tau^-, \tau^-\right]\right)^B} \right| \sigma_{E,i}(\tau), \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right] \\ &= \frac{\iint H\left(\hat{\theta}_\tau^+, \tau^+\right)^B p\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+, q_{ii,\tau}^+, \tau^+\right) \phi\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+ \middle| \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, \Delta\Sigma_{E,i}\right) d\hat{\theta}_\tau^+ d\hat{g}_{i,\tau}^+}{\left[\int_{-\infty}^{+\infty} H\left(\hat{\theta}_\tau^+, \tau^+\right) \phi_1\left(\hat{\theta}_\tau^+ \middle| \hat{\theta}_\tau^-, \Delta q_{\theta\theta}(\tau)\right) d\hat{\theta}_\tau^+\right]^B} \\ &= \frac{\iint e^{B \ln H\left(\hat{\theta}_\tau^+, \tau^+\right) + \ln p\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+, q_{ii,\tau}^+, \tau^+\right)} \phi\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+ \middle| \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, \Delta\Sigma_{E,i}\right) d\hat{\theta}_\tau^+ d\hat{g}_{i,\tau}^+}{\left[\int e^{\ln H\left(\hat{\theta}_\tau^+, \tau^+\right)} \phi_1\left(\hat{\theta}_\tau^+ \middle| \hat{\theta}_\tau^-, \Delta q_{\theta\theta}(\tau)\right) d\hat{\theta}_\tau^+\right]^B}. \end{aligned}$$

Step 2. Average over the heterogeneity in $\sigma_{E,i}(\tau)$.

We compute the unconditional expectation by averaging over all possible realizations of $\sigma_{E,i}(\tau)$. This step allows us to derive the preannouncement price-to-dividend ratio based on the information set $\left\{\hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right\}$ right before the announcement. Since each $\sigma_{E,i}(\tau)$ has probability $1/N$, this gives

$$\begin{aligned} p\left(\hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right) &= \mathbb{E}\left[p\left(\sigma_{E,i}(\tau); \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right) \middle| \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right] \\ &= \sum_{n=1}^{N} \frac{1}{N} p\left(\sigma_{E,n}; \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right). \end{aligned}$$

Second, we derive the boundary condition at the macro announcement T. Since the macroeconomic announcement is fully revealing and happens immediately after the earnings announcement ($T^- = \tau^+$), we have $q_{\theta\theta}^+(T) = 0$ and $q_{\theta g_i}^+(T) = 0$. Using the boundary conditions for beliefs, we have $q_{\theta\theta}^+(\tau) = \dfrac{q_{\theta\theta}^-(\tau)}{1 + q_{\theta\theta}^-(\tau)\bar{s}_\Sigma}$, $\alpha_i(\tau) = \frac{q_{ii}^-(\tau)}{q_{ii}^-(\tau) + \sigma_{E,i}^2(\tau)}$, $\bar{s}_\Sigma = \sum_{j=1}^N \frac{1}{q_{jj}^-(\tau) + \sigma_{E,j}^2(\tau)}$. The posterior means

after the macroeconomic announcement satisfy $\begin{pmatrix} \hat{\theta}^+(T) \\ \hat{g}_i^+(T) \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} \hat{\theta}^-(T) \\ \hat{g}_i^-(T) \end{pmatrix}, \Delta\Sigma_{M,i} \right)$, where

$$\Delta\Sigma_{M,i} = \begin{pmatrix} \Delta q_{\theta\theta}(T) & \Delta q_{\theta g_i}(T) \\ \Delta q_{\theta g_i}(T) & \Delta q_{ii}(T) \end{pmatrix} = \begin{pmatrix} q_{\theta\theta}^+(\tau) & -\alpha_i(\tau) q_{\theta\theta}^+(\tau) \\ -\alpha_i(\tau) q_{\theta\theta}^+(\tau) & \alpha_i^2(\tau) q_{\theta\theta}^+(\tau) \end{pmatrix}, \tag{A.54}$$

i.e., $\Delta q_{\theta\theta}(T) = q_{\theta\theta}^+(\tau)$, $\Delta q_{\theta g_i}(T) = -\alpha_i(\tau) q_{\theta\theta}^+(\tau)$, $\Delta q_{ii}(T) = q_{ii}^-(T) - q_{ii}^+(T) = q_{ii}^+(\tau) - q_{ii}^+(T) = \alpha_i^2(\tau) q_{\theta\theta}^+(\tau)$.

This can be further simplified into a one-dimensional problem (degeneracy). Conditional on $\hat{\theta}^+(T)$, the conditional variance of $\hat{g}_i^+(T)$ is zero:

$$\hat{g}_i^+(T) = \hat{g}_i^-(T) - \alpha_i(\tau)\big(\hat{\theta}_T^+ - \hat{\theta}_T^-\big). \tag{A.55}$$

Hence the joint Gaussian integral over $(\hat{\theta}^+, \hat{g}_i^+)$, i.e., $\iint(.)\phi(.)$ collapses to a one-dimensional integral over $\hat{\theta}^+ \sim \mathcal{N}\big(\hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\big)$.

We again compute the boundary condition in two steps. First, condition on a realization of $\sigma_{E,i}(\tau)$, so that $\hat{\theta}^+ \sim \mathcal{N}\big(\hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\big)$. This intermediate step $p\left(\sigma_{E,i}(\tau); \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right)$ can be computed as

$$\begin{aligned} p\left(\sigma_{E,i}(\tau); \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right) &= \mathbb{E}\left[\frac{H\left(\hat{\theta}_T^+, T^+\right)^B p\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+, q_{ii,T}^+, T^+\right)}{\left(\mathbb{E}\left[H\left(\hat{\theta}_T^+, T^+\right) \mid \hat{\theta}_T^-, T^-\right]\right)^B} \middle| \sigma_{E,i}(\tau), \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^- \right] \\ &= \frac{\int_{-\infty}^{+\infty} H\left(\hat{\theta}_T^+, T^+\right)^B p\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+(\hat{\theta}_T^+), q_{ii,T}^+, T^+\right) \phi_1\left(\hat{\theta}_T^+ \middle| \hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\right) d\hat{\theta}_T^+}{\left[\int_{-\infty}^{+\infty} H\left(\hat{\theta}_T^+, T^+\right) \phi_1\left(\hat{\theta}_T^+ \middle| \hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\right) d\hat{\theta}_T^+\right]^B} \\ &= \frac{\int e^{B \ln H\left(\hat{\theta}_T^+, T^+\right) + \ln p\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+(\hat{\theta}_T^+), q_{ii,T}^+, T^+\right)} \phi_1\left(\hat{\theta}_T^+ \middle| \hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\right) d\hat{\theta}_T^+}{\left[\int e^{\ln H\left(\hat{\theta}_T^+, T^+\right)} \phi_1\left(\hat{\theta}_T^+ \middle| \hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\right) d\hat{\theta}_T^+\right]^B}. \end{aligned}$$

Next, we compute the unconditional expectation by averaging over all possible realizations of

$\sigma_{E,i}(\tau)$:

$$\begin{aligned} p\left(\hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right) &= \mathbb{E}\left[p\left(\sigma_{E,i}(\tau); \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right) \middle| \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right] \\ &= \sum_{n=1}^{N} \frac{1}{N} p\left(\sigma_{E,n}; \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right). \end{aligned}$$

□

Risk premium We next compute the equity risk premium for firm i in the interior (without announcements); the announcement premium at the boundary can be obtained directly from Proposition 2 by plugging in the boundary solutions for the price-to-dividend ratios derived in Lemma A.4.

Lemma A.5. *In the interior $(0, \tau)$, the instantaneous risk premium is*

$$\mathbb{E}_t\left[\frac{d\left[p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) D_{i,t}\right] + D_{i,t}dt}{p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) D_{i,t}}\right] - r\left(\hat{\theta}_t, t\right) dt = \left(\gamma\sigma_C - \frac{\frac{1}{\psi} - \gamma}{\sigma_C\left(1-\gamma\right)} \frac{H_\theta}{H} q_{\theta\theta,t}\right)\left(\sigma_C + \frac{p_\theta}{p}\frac{q_{\theta\theta,t}}{\sigma_C}\right) dt, \tag{A.56}$$

where subscripts on H and p denote the corresponding partial derivatives.

Proof. Conjecture that the cumulative return takes the following form:

$$\frac{dR\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right)}{R\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right)} = \mu_R\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) dt + \sigma_{RC}\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) d\hat{B}_{C,t} + \sigma_u dB_{u,t} + \sigma_{RD}\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) d\hat{B}_{D_i,t}. \tag{A.57}$$

The cumulative return can be computed as

$$\frac{dR_t}{R_t} = \frac{1}{p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) D_{i,t}}\left[D_{i,t}dt + d\left(p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) D_{i,t}\right)\right] = \frac{1}{p}dt + \frac{d\left(pD\right)}{pD},$$

$$\begin{aligned}\frac{d\left(p\left(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t\right)D_{i,t}\right)}{p\left(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t\right)D_{i,t}} &= \left\{\left(\hat{\theta}_t+\hat{g}_{i,t}\right)+\frac{1}{p}\left[p_t+p_\theta a\left(\bar{\theta}-\hat{\theta}_t\right)+\frac{1}{2}p_{\theta\theta}\frac{q_{\theta\theta}^2}{\sigma_C^2}+p_g b\left(\bar{g}-\hat{g}_{i,t}\right)\right.\right.\\ &\quad\left.\left.+\frac{1}{2}p_{gg}\frac{q_{ii}^2}{\sigma_D^2}+p_q\left(\sigma_g^2-2bq_{ii}-\frac{q_{ii}^2}{\sigma_D^2}\right)\right]+\frac{p_\theta}{p}q_{\theta\theta}+\frac{p_g}{p}q_{ii}\right\}dt\\ &\quad+\left(\sigma_C+\frac{p_\theta}{p}\frac{q_{\theta\theta}}{\sigma_C}\right)d\hat{B}_{C,t}+\sigma_u dB_{u,t}+\left(\sigma_D+\frac{p_g}{p}\frac{q_{ii}}{\sigma_D}\right)d\hat{B}_{D_i,t}.\end{aligned}$$

Therefore,

$$\begin{aligned}\mu_R\left(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t\right) &= \hat{\theta}_t+\hat{g}_{i,t}+\frac{1}{p}\left[1+p_t+p_\theta\left[a\left(\bar{\theta}-\hat{\theta}_t\right)+q_{\theta\theta}\right]+\frac{1}{2}p_{\theta\theta}\frac{q_{\theta\theta}^2}{\sigma_C^2}\right.\\ &\quad\left.+p_g\left[b\left(\bar{g}-\hat{g}_{i,t}\right)+q_{ii}\right]+\frac{1}{2}p_{gg}\frac{q_{ii}^2}{\sigma_D^2}+p_q\left(\sigma_g^2-2bq_{ii}-\frac{q_{ii}^2}{\sigma_D^2}\right)\right], \quad \text{(A.58)}\end{aligned}$$

$\sigma_{RC}\left(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t\right)=\sigma_C+\frac{p_\theta}{p}\frac{q_{\theta\theta}}{\sigma_C}$, and $\sigma_{RD}\left(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t\right)=\sigma_D+\frac{p_g}{p}\frac{q_{ii}}{\sigma_D}$. Together with the pricing kernel, the instantaneous risk premium is therefore

$$\begin{aligned}\mathbb{E}_t\left[\frac{dR_{i,t}}{R_{i,t}}\right]-r_t dt &= -\mathrm{Cov}_t\left(\frac{dM_t}{M_t},\frac{dR_{i,t}}{R_{i,t}}\right)\\ \mu_{R_i,t}-r_t &= \sigma_M\sigma_{RC}=\left(\gamma\sigma_C-\frac{\frac{1}{\psi}-\gamma}{\sigma_C\left(1-\gamma\right)}\frac{H_\theta}{H}q_{\theta\theta}\right)\left(\sigma_C+\frac{p_\theta}{p}\frac{q_{\theta\theta}}{\sigma_C}\right).\end{aligned}$$

The loadings σ_u and σ_{RD} carry no risk premium because B_u and B_{D_i} are orthogonal to the pricing kernel; the aggregate dividend shock raises return volatility but not expected returns. □

A.4 Timing of Earnings Announcements

Proof of Proposition 3 At the start of the current cycle, firm j announced earnings immediately after the previous fully revealing macroeconomic announcement. Because the aggregate state was known, the earnings announcement updated only g_j, so $q_{\theta g_j}(0)=0$. The belief dynamics derived in Appendix A.1 imply that this covariance remains zero until the next macroeconomic announcement T. Hence,

$$q^-_{\theta g_j}(T)=0.$$

At the current macroeconomic announcement, θ_T is fully revealed. Since $q^-_{\theta g_j}(T)=0$, firm j's

belief does not respond to the macroeconomic surprise:

$$\hat{g}^+_{j,T} - \hat{g}^-_{j,T} = \frac{q^-_{\theta g_j}(T)}{q^-_{\theta\theta}(T)} \left(\theta_T - \hat{\theta}^-_T\right) = 0.$$

Thus, conditional on information at T^-, firm j's belief does not vary across possible macroeconomic announcement outcomes, and

$$\mathrm{Cov}_{T^-}\left(\hat{\theta}^+_T, \hat{g}^+_{j,T}\right) = 0.$$

A.5 Model Implications

Here we provide details for computing earnings announcement and macro announcement betas. We define the market return as the equal-weighted average of returns from all firms. The market contains $2N$ firms: the N recent announcers, whose $\sigma_{E,i}(\tau)$ are drawn from F_E and assigned to firms by random permutation, and the N non-announcers, which correspond to the limiting type $\sigma_{E,i}(\tau) \to \infty$. The earnings announcement and macro announcement returns, market returns, and betas are defined separately below. EA moments are conditional on investors' information set at τ^-, and MA moments are conditional on the information set at T^-; we omit these conditioning subscripts from the expectations below.

Earnings Announcement (EA) Beta Let τ denote the earnings announcement time. The EA gross returns for equity i and for the market portfolio are

$$R_{E,i} \equiv \frac{p_i(\tau^+)}{p_i(\sigma_{E,i}(\tau); \tau^-)}, \quad R_{E,M} \equiv \frac{1}{2N} \sum_{j=1}^{2N} R_{E,j},$$

where $p_i(t) \equiv p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)$ and $p_i(\sigma_{E,i}(\tau); \tau^-) \equiv p(\sigma_{E,i}(\tau); \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, q^-_{ii,\tau}, \tau^-)$, with $p_i(\sigma_{E,i}(\tau); T^-)$ defined analogously.

Let $\phi_\tau(d\hat{\theta}^+_\tau, d\hat{g}^+_{i,\tau} \mid \sigma_{E,i}(\tau))$ denote the joint law of post-EA posterior means implied by the Kalman update (given $\sigma_{E,i}(\tau)$); then the first moment is

$$\mathbb{E}\left[R_{E,i} \mid \sigma_{E,i}(\tau)\right] = \frac{1}{p_i(\sigma_{E,i}(\tau); \tau^-)} \iint p\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}, q^+_{ii,\tau}, \tau^+\right) \phi_\tau(d\hat{\theta}^+_\tau, d\hat{g}^+_{i,\tau} \mid \sigma_{E,i}(\tau)).$$

The market mean is

$$\mathbb{E}\left[R_{E,M} \mid \sigma_{E,i}(\tau)\right] = \frac{1}{2N}\sum_{j=1}^{2N}\mathbb{E}\left[R_{E,j} \mid \sigma_{E,i}(\tau)\right].$$

The cross moment is

$$\begin{aligned}\mathbb{E}\left[R_{E,i}R_{E,M} \mid \sigma_{E,i}(\tau)\right] &= \mathbb{E}\left[R_{E,i}\frac{1}{2N}\sum_{j=1}^{2N}R_{E,j} \mid \sigma_{E,i}(\tau)\right] = \frac{1}{2N}\sum_{j=1}^{2N}\mathbb{E}\left[R_{E,i}R_{E,j} \mid \sigma_{E,i}(\tau)\right] \\ &= \frac{1}{2N}\mathbb{E}\left[R_{E,i}^2 \mid \sigma_{E,i}(\tau)\right] + \frac{1}{2N}\sum_{j\neq i}\mathbb{E}\left[R_{E,i}R_{E,j} \mid \sigma_{E,i}(\tau)\right],\end{aligned}$$

where

$$\mathbb{E}[R_{E,i}^2 \mid \sigma_{E,i}(\tau)] = \frac{1}{p_i(\sigma_{E,i}(\tau);\tau^-)^2}\iint\left(p(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+, q_{ii,\tau}^+, \tau^+)\right)^2\phi_\tau(d\hat{\theta}_\tau^+, d\hat{g}_{i,\tau}^+ \mid \sigma_{E,i}(\tau)).$$

The second moment is

$$\begin{aligned}\mathbb{E}\left[(R_{E,M})^2 \mid \sigma_{E,i}(\tau)\right] &= \mathbb{E}\left[\left(\frac{1}{2N}\sum_{j=1}^{2N}R_{E,j}\right)^2\middle|\,\sigma_{E,i}(\tau)\right] \\ &= \frac{1}{(2N)^2}\sum_{j=1}^{2N}\mathbb{E}[R_{E,j}^2 \mid \sigma_{E,i}(\tau)] + \frac{2}{(2N)^2}\sum_{1\leq j<k\leq 2N}\mathbb{E}[R_{E,j}R_{E,k} \mid \sigma_{E,i}(\tau)].\end{aligned}$$

Across firms, firm-specific beliefs are independent, and the pooled aggregate update $\hat{\theta}_\tau^+$ depends on the pooled informativeness $\bar{s}_\Sigma$ rather than any single firm's $\sigma_{E,i}(\tau)$; the cross-firm comoments therefore arise solely through the shared aggregate component. As a result,

$$\beta_{E,i}(\sigma_{E,i}(\tau)) = \frac{\mathbb{E}\left[R_{E,i}R_{E,M} \mid \sigma_{E,i}(\tau)\right] - \mathbb{E}\left[R_{E,i} \mid \sigma_{E,i}(\tau)\right]\mathbb{E}\left[R_{E,M} \mid \sigma_{E,i}(\tau)\right]}{\mathbb{E}\left[(R_{E,M})^2 \mid \sigma_{E,i}(\tau)\right] - \left(\mathbb{E}\left[R_{E,M} \mid \sigma_{E,i}(\tau)\right]\right)^2}. \tag{A.59}$$

Because $R_{E,M}$ is increasing in $\hat{\theta}_\tau^+$ and the EA induces $\mathrm{Cov}_{\tau^-}(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+) = \alpha_i(\tau)q_{\theta\theta}^+(\tau) \geq 0$, we obtain $\beta_{E,i} \geq 0$. Moreover, $\alpha_i(\tau)$ rises as $\sigma_{E,i}^2(\tau)$ falls, so $\beta_{E,i}$ increases with EA precision. The expected

EA return (conditional on $\sigma_{E,i}(\tau)$) is

$$\mathbb{E}[R_{E,i} \mid \sigma_{E,i}(\tau)] = \frac{\mathbb{E}\left[p\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+, q_{ii,\tau}^+, \tau^+\right) \middle| \sigma_{E,i}(\tau)\right]}{p\left(\sigma_{E,i}(\tau); \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right)}. \tag{A.60}$$

Macroeconomic Announcement (MA) Beta Let T denote the macro announcement time. The MA gross returns for equity i and for the market portfolio are

$$R_{M,i} \equiv \frac{p_i(T^+)}{p_i(\sigma_{E,i}(\tau); T^-)}, \qquad R_{M,M} \equiv \frac{1}{2N}\sum_{j=1}^{2N} R_{M,j}.$$

Conditional on $\sigma_{E,i}(\tau)$, the MA beta is

$$\beta_{M,i}(\sigma_{E,i}(\tau)) = \frac{\mathrm{Cov}_{T^-}\left(\, R_{M,i}, R_{M,M} | \, \sigma_{E,i}(\tau)\right)}{\mathrm{Var}_{T^-}\left(\, R_{M,M} | \, \sigma_{E,i}(\tau)\right)}.$$

Let $\phi_T(d\hat{\theta}_T^+, d\hat{g}_{i,T}^+ \mid \sigma_{E,i}(\tau))$ denote the joint post-MA law of $(\hat{\theta}_T^+, \hat{g}_{i,T}^+)$ (with $T^- = \tau^+$). Then the first moment is

$$\mathbb{E}[R_{M,i} \mid \sigma_{E,i}(\tau)] = \frac{1}{p_i(\sigma_{E,i}(\tau); T^-)} \iint p(\hat{\theta}_T^+, \hat{g}_{i,T}^+, q_{ii,T}^+, T^+)\, \phi_T(d\hat{\theta}_T^+, d\hat{g}_{i,T}^+ \mid \sigma_{E,i}(\tau)).$$

The market mean is

$$\mathbb{E}[R_{M,M} \mid \sigma_{E,i}(\tau)] = \frac{1}{2N}\sum_{j=1}^{2N} \mathbb{E}[R_{M,j} \mid \sigma_{E,i}(\tau)].$$

The cross moment is computed using $R_{M,M} = \frac{1}{2N}\sum_{j=1}^{2N} R_{M,j}$:

$$\begin{aligned}
\mathbb{E}[R_{M,i}R_{M,M} \mid \sigma_{E,i}(\tau)] &= \mathbb{E}\left[R_{M,i}\frac{1}{2N}\sum_{j=1}^{2N} R_{M,j} | \sigma_{E,i}(\tau)\right] = \frac{1}{2N}\sum_{j=1}^{2N}\mathbb{E}[R_{M,i}R_{M,j} \mid \sigma_{E,i}(\tau)] \\
&= \frac{1}{2N}\mathbb{E}[R_{M,i}^2 \mid \sigma_{E,i}(\tau)] + \frac{1}{2N}\sum_{j\neq i}\mathbb{E}[R_{M,i}R_{M,j} \mid \sigma_{E,i}(\tau)],
\end{aligned}$$

where

$$\mathbb{E}[R_{M,i}^2 \mid \sigma_{E,i}(\tau)] = \frac{1}{p_i(\sigma_{E,i}(\tau); T^-)^2} \iint \left(p(\hat{\theta}_T^+, \hat{g}_{i,T}^+, q_{ii,T}^+, T^+)\right)^2 \phi_T(d\hat{\theta}_T^+, d\hat{g}_{i,T}^+ \mid \sigma_{E,i}(\tau)).$$

The second moment of the market MA return is

$$\begin{aligned}\mathbb{E}[(R_{M,M})^2 \mid \sigma_{E,i}(\tau)] &= \mathbb{E}\left[\left(\frac{1}{2N}\sum_{j=1}^{2N} R_{M,j}\right)^2 \middle| \sigma_{E,i}(\tau)\right] \\ &= \frac{1}{(2N)^2}\sum_{j=1}^{2N}\mathbb{E}[R_{M,j}^2 \mid \sigma_{E,i}(\tau)] + \frac{2}{(2N)^2}\sum_{1\le j<k\le 2N}\mathbb{E}[R_{M,j}R_{M,k} \mid \sigma_{E,i}(\tau)].\end{aligned}$$

As a result,

$$\beta_{M,i}(\sigma_{E,i}(\tau)) = \frac{\mathbb{E}[R_{M,i}R_{M,M} \mid \sigma_{E,i}(\tau)] - \mathbb{E}[R_{M,i} \mid \sigma_{E,i}(\tau)]\mathbb{E}[R_{M,M} \mid \sigma_{E,i}(\tau)]}{\mathbb{E}[(R_{M,M})^2 \mid \sigma_{E,i}(\tau)] - \left(\mathbb{E}[R_{M,M} \mid \sigma_{E,i}(\tau)]\right)^2}. \tag{A.61}$$

At the MA, $\hat{\theta}_T^+ = \theta_T$ and $\mathrm{Cov}_{T^-}(\hat{\theta}_T^+, \hat{g}_{i,T}^+) = -\alpha_i(\tau)q_{\theta\theta}^+(\tau) \le 0$. Because the macro announcement fully reveals θ_T, all firms' post-MA prices depend on the common realization of $\hat{\theta}_T^+$, generating comovement in returns through the shared aggregate revelation. Together with the induced negative revision in $\hat{g}_{i,T}^+$ proportional to $\alpha_i(\tau)$, this implies that $\beta_{M,i}$ is reduced relative to the non-announcer benchmark and falls further as EA precision increases (larger $\alpha_i(\tau)$, smaller $\sigma_{E,i}^2(\tau)$). The expected gross MA return (conditional on $\sigma_{E,i}(\tau)$) is

$$\mathbb{E}[R_{M,i} \mid \sigma_{E,i}(\tau)] = \frac{\mathbb{E}\left[p\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+, q_{ii,T}^+, T^+\right) \middle| \sigma_{E,i}(\tau)\right]}{p\left(\sigma_{E,i}(\tau); \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right)}. \tag{A.62}$$

Appendix B: Data and Additional Empirical Tests

B.1 Data Construction

Sample Universe Our intraday sample covers U.S. common stocks listed on NYSE, AMEX, or NASDAQ with active trading status, yielding 25,280 unique PERMNOs over the full sample period.

High-Frequency Returns We construct intraday midpoint prices from the national best bid and offer (NBBO) using two sources of Trade and Quote (TAQ) data: Monthly TAQ (MTAQ) from January 1993 through December 2013, and Daily TAQ (DTAQ) from January 2014 onward, which Holden and Jacobsen (2014) show to be the preferred source for intraday quotes when available.

For the MTAQ sample, we follow the Holden and Jacobsen (2014) quote-cleaning procedure. These filters are consistent with standard practice in the literature. We filter quotes with abnormal condition codes, remove crossed quotes (the bid exceeds the offer and both prices are positive), handle one-sided quotes, exclude quotes with spreads exceeding \$5, and set withdrawn quotes (with zero, negative, or missing prices or depths) to extreme values so they do not enter the NBBO. We assign interpolated timestamps to order multiple quotes arriving within the same second, then compute the NBBO by retaining the best bid and offer across all exchanges at each interpolated time.

For the DTAQ sample, we begin with the precomputed NBBO file and supplement it with individual exchange quotes that qualify as national best bids or offers. We filter on standard quote conditions, remove cancelled quotes, and exclude records with non-positive prices or depths. When the spread exceeds \$5, we compare bid and offer prices against the previous NBBO midpoint and discard whichever side deviates by more than \$2.50.

In both samples, when multiple NBBO updates occur within the same second, we retain the median bid and offer following Barndorff-Nielsen, Hansen, Lunde, and Shephard (2009). We then aggregate to 5-minute intervals by selecting the last NBBO observation in each window. Midpoint prices are computed as the average of the best bid and offer. From these 5-minute midpoints, we sample prices every 25 minutes between 9:45 a.m. and 4:00 p.m., retaining only observations at

each 25-minute mark. We combine these intraday returns with the overnight return, computed between 4:00 p.m. on the previous day and 9:45 a.m. on the current day, yielding sixteen returns per day. The choice of a 25-minute interval follows Patton and Verardo (2012), who use this interval to balance the accuracy of daily beta estimates against market-microstructure effects, and is supported by prior work aimed at mitigating microstructure noise (see Bollerslev, Law, and Tauchen (2008) and Todorov and Bollerslev (2010)). The market return is measured using the S&P 500 index, proxied by the SPY exchange-traded fund, also available on TAQ. All midpoint prices are adjusted for stock splits and dividends using CRSP daily cumulative price adjustment factors before computing returns.

We restrict the sample to non-financial firms (SIC codes outside 6000–6999). We also apply two filters to the return series. First, we remove price outliers using a dynamic bound. For each stock-year, we compute the median intraday price level and the median of the daily standard deviations of the intraday price level (in dollars). We discard any observation whose price differs from the yearly median by more than ten times this dollar standard deviation, scaled by $\sqrt{252}$. This scaling only sets the band width and is not a return-volatility annualization. Second, we drop the first return observation following any gap exceeding four calendar days to avoid contamination from stale prices.

Earnings Announcement Days We identify quarterly earnings announcements using the announcement dates and times recorded in I/B/E/S. We only use announcement dates with a valid timestamp (we delete observations with an announcement time of 00:00). Announcements recorded at or after 4:00 p.m. are assigned to the following trading day, since price reactions occur only when the market opens. Our analysis focuses exclusively on expected earnings announcements, consistent with our theoretical framework, which applies only to scheduled announcements. Expected announcements are defined by requiring that the actual I/B/E/S timestamped announcement falls within a 10-day window around the expected announcement date, following the approach in Savor and Wilson (2016), which relies on Compustat announcement dates. This procedure ensures that we retain only firms that issue an announcement and do so within their anticipated disclosure window. Our final sample contains 232,641 earnings announcements. Table B.1 presents summary

statistics. The earnings-day portfolio returns are computed as daily cross-sectional averages and then averaged over 1994–2024. On earnings announcement days, the equal-weighted average return is approximately 11 bps, a magnitude consistent with the announcement premium documented in Savor and Wilson (2016).

Macroeconomic Announcement Days We consider four major scheduled U.S. macroeconomic announcements: total Nonfarm Payroll employment (NFP), Gross Domestic Product (GDP), the Institute for Supply Management's manufacturing index (ISM), and FOMC meetings. NFP, GDP, and ISM are released monthly; the FOMC meets eight times per year.[1] Data on these announcements are from the websites of the entities that release them. NFP and GDP are public statistics released by government agencies at 8:30 a.m. Eastern Time. ISM is an economic indicator released by a private institution, typically at 10:00 a.m. FOMC announcements are typically around 2:00 p.m. We exclude macro announcements immediately preceded by another macroeconomic announcement. Table B.1 summarizes average raw returns on macroeconomic announcement days. Across all macroeconomic announcement days in our sample, we observe 4,403,988 firm-day observations. The equal-weighted daily raw return on macroeconomic announcement days is approximately 20 bps, consistent with the sizable risk premia around macroeconomic news releases documented in Savor and Wilson (2013) and Ai and Bansal (2018). By contrast, on days without earnings or macroeconomic announcements, the average raw return is approximately 2.5 bps.

Consensus Macroeconomic Forecasts We measure macroeconomic surprises from two sources. For GDP (advance estimate), Nonfarm Payrolls (NFP), and ISM Manufacturing, we use Bloomberg consensus surveys. The forecast error is the realized value minus the survey median, divided by the survey high-low range. Forecast errors are signed so that positive values correspond to outcomes that are more expansionary than expected. FOMC surprises are measured using high-frequency monetary policy shocks from Bauer and Swanson (2023).The monetary policy shock is re-signed so that positive values indicate more expansionary (accommodative) surprises. We exclude extreme

[1] We exclude CPI and PPI releases because their ordering varies over time, with CPI released first in some periods and PPI released first in others. This variation makes it difficult to identify when uncertainty is resolved and may contaminate our estimates, since the timing of macroeconomic announcements relative to earnings announcements is central to our empirical identification.

Table B.1: Returns on Macroeconomic and Earnings Announcement Days

	N (firm-days)	Mean (bps)	t-stat
Expected EA	232,641	11.18	(3.23)
MA	4,403,988	19.90	(5.41)
non-EA & non-MA	20,141,752	2.50	(2.35)

Daily equal-weighted raw returns are reported in basis points as cross-sectional averages. The row Expected EA presents returns for firm-days on expected earnings announcement (EA) dates, identified using timestamped I/B/E/S announcements and aligned to the next trading day for after-hours releases. The row MA reports analogous statistics for macroeconomic announcement (MA) dates (NFP, GDP, ISM, and FOMC). The "non-EA & non-MA" category excludes both earnings and macroeconomic announcement days. Returns are winsorized at the 0.5th and 99.5th percentiles. Financial firms (SIC 6000–6999) are excluded. Market equity is required to be at least $10 million. The sample period is 1994–2024.

outliers from April to July 2020. All macroeconomic forecast errors are winsorized at the 0.5th and 99.5th percentiles within each series and then standardized to have zero mean and unit variance. When multiple macro announcements occur on the same day, standardized surprises are averaged across releases; days with conflicting signs across announcements are excluded from the sample.

Individual Firm Earnings Forecasts We measure firm-specific belief revisions using I/B/E/S Detail (individual analyst forecasts) for annual earnings per share, focusing on forecasts for the nearest unreported fiscal year (forecast period indicator, FPI = 1), the most frequently updated set of forecasts. For a given broker-analyst-firm triple, a forecast revision is defined as the change in the analyst's forecast relative to that analyst's most recent prior forecast, scaled by the absolute value of actual EPS; the first observed forecast for a given broker-analyst-firm is therefore not treated as a revision. The forecast revision is winsorized at the 1st and 99th percentiles. We assign each revision to a calendar date, with revisions before 8:00 a.m. assigned to the previous business day and weekend revisions assigned to the following Monday. We also exclude revisions filed on or immediately after a firm's own earnings announcement, either on the same business day at or after the announcement time or on the following business day, to avoid contamination from the firm's own earnings release. Revisions that are stale, defined as forecasts unchanged from the prior forecast for more than 180 days, are excluded. This yields a panel of 1,616,312 analyst revisions, of which 364,102 fall on macroeconomic announcement days.

Construction of Calibration Moments Aggregate consumption is annual real per-capita expenditure on nondurables and services (NIPA, CPI-deflated), and consumption growth moments are computed from the annual log series over 1929–2024. The market return and its volatility are computed from monthly CRSP value-weighted returns and annualized; the real risk-free rate is the Fama-French rate minus realized CPI inflation. Dividend growth is constructed from CRSP value-weighted returns with and without dividends following the method in Welch and Goyal (2008), with dividends summed over 12-month windows and deflated by the CPI.

Firm-level moments are computed over 1994–2024 for non-financial common stocks with market capitalization of at least $10 million. Idiosyncratic return volatility is the firm-year residual volatility from a daily market-model regression estimated outside earnings-announcement windows, value-weighted by market capitalization so that the moment reflects the representative large firm rather than the small-cap-dominated median. Earnings-announcement-day return volatility is the standard deviation of raw returns across expected announcement events, with announcement dates from I/B/E/S.

The cross-sectional dispersion of long-run average growth is computed from real sales growth in Compustat for firms in the same universe with at least twenty annual observations. Growth rates are demeaned by their cross-sectional mean each year, as in the model statistic; the dispersion is the square root of the difference between the between-firm variance of firms' average growth and the average within-firm sampling variance, which removes the estimation noise. The corresponding model moment is constructed analogously from simulated dividend growth.

B.2 Additional Empirical Tests

B.2.1 Cash-Flow vs. Discount-Rate News on FOMC Days

Our model attributes the repricing effect to the resolution of uncertainty about aggregate cash flows. A natural concern is that FOMC announcements primarily convey discount-rate news rather than cash-flow news, and that the repricing we document on FOMC days operates through the discount-rate news channel. In the model, however, the two types of news are not separate: the equity discount rate is the risk-free rate $r(\hat{\theta}_t, t)$ plus a risk premium proportional to the market

price of risk $\sigma_M(\hat{\theta}_t, t)$, and both are functions of beliefs about aggregate cash flows, so cash-flow news translates into discount-rate news in equilibrium. The model therefore does not predict that the repricing premium is confined to days labeled as cash-flow news.

To address this empirically, we decompose FOMC announcements into two samples: days dominated by cash-flow news and days dominated by discount-rate news, using the sign restriction of Jarociński and Karadi (2020). Their approach classifies each FOMC announcement based on the comovement of stock prices and interest rates in a narrow window around the announcement. When stock prices and interest rates move in the same direction, the announcement is classified as containing cash-flow (or "central bank information") news; when they move in opposite directions, the announcement is classified as pure discount-rate news. We construct a cash-flow news indicator CBI_{pm} equal to one when this classification identifies cash-flow news, and zero otherwise.

Table B.2 reports the results. Panel A shows the average matched-portfolio long-short return (non-announcers minus recent announcers) on FOMC days, split by news type. On all 205 FOMC days in our sample, the equal-weighted long-short spread is 5.30 bps ($t = 2.51$) and the value-weighted spread is 10.60 bps ($t = 2.72$). Restricting to discount-rate-only days ($N = 129$) yields spreads of 5.90 and 10.20 bps; restricting to cash-flow news days ($N = 76$) yields 4.40 and 11.30 bps. The repricing effect is present on both types of FOMC days.

Panel B formalizes this comparison by regressing the date-level long-short return on the cash-flow news indicator across all 205 FOMC days. The intercept captures the baseline spread on discount-rate-only days, and the slope measures any differential effect on cash-flow news days. The slope coefficient is not statistically significant for either equal-weighted ($\beta = -1.60$, $t = -0.35$) or value-weighted ($\beta = 1.10$, $t = 0.13$) returns. The repricing premium does not differ across FOMC news types.

B.2.2 Robustness to FOMC and Non-FOMC Announcement Days

FOMC announcements account for a substantial share of macroeconomic announcement days in our sample. To ensure that the repricing effects documented in Tables 4 and 5 are not driven solely by FOMC events, we split macroeconomic announcement days into FOMC and other macroeconomic

Table B.2: FOMC Day Analysis: Discount-Rate vs. Cash-Flow News

	EW L–S (bps)		VW L–S (bps)	
	Mean	t	Mean	t
Panel A: Conditional Means				
All FOMC ($N = 205$)	5.30	(2.51)	10.60	(2.72)
Discount-rate only ($N = 129$)	5.90	(2.16)	10.20	(1.99)
Cash-flow news ($N = 76$)	4.40	(1.29)	11.30	(1.89)
Panel B: Regression on the Cash-Flow Indicator				
α (discount-rate baseline)	5.90	(2.20)	10.20	(2.07)
β (cash-flow − discount)	−1.60	(−0.35)	1.10	(0.13)

Panel A reports average matched-portfolio long-short returns (non-announcers minus recent announcers) on FOMC announcement days, split by the type of monetary policy news. Panel B regresses the date-level long-short return on a cash-flow news indicator across all 205 FOMC dates. Cash-flow news days have $CBI_{pm} = 1$ in the Jarociński and Karadi (2020) decomposition; discount-rate-only days have $CBI_{pm} = 0$. Same matched-portfolio design as Table 4 (announcers within the prior 15 trading days, matched on industry and size). t-statistics in parentheses.

announcement (non-FOMC) days and re-estimate our main results separately in these subsamples.

Table B.3: Performance of Recent Announcers and Non-Announcers on Macroeconomic Announcement Days: FOMC vs. Other Macro

	Other Macro ($N = 313$)		FOMC ($N = 107$)	
	EW (bps)	VW (bps)	EW (bps)	VW (bps)
Non-announcers (Long)	7.30	7.10	2.30	6.90
	(2.09)	(1.95)	(0.37)	(2.01)
Recent Announcers (Short)	−0.70	−0.90	−3.30	−1.00
	(−0.19)	(−0.37)	(−0.54)	(−0.34)
Long-short	8.00	8.10	5.60	7.90
	(3.24)	(1.99)	(2.02)	(1.90)

This table reports daily CAPM-neutral returns (in basis points) on macroeconomic announcement days for portfolios formed on the preceding trading day, split by announcement type. The short portfolio consists of firms that issued a scheduled earnings announcement within the prior 15 trading days. The long portfolio consists of firms without recent earnings announcements, matched to recent announcers on industry and size. Returns are adjusted by subtracting each stock's unconditional CAPM beta times the market return from its return. Both equal-weighted (EW) and value-weighted (VW) portfolio returns are reported for each announcement day. The table reports time-series means, with t-statistics in parentheses. Other Macro includes NFP, GDP, and ISM announcement days; FOMC includes FOMC-only announcement days.

Table B.3 splits the recent announcer versus non-announcer comparison from Table 4 by macroeconomic announcement type. The equal-weighted long-short spread remains positive and statistically significant in both subsamples: 8.00 bps ($t = 3.24$) on other macro announcement days and 5.60 bps ($t = 2.02$) on FOMC days. Table B.4 repeats this decomposition for the portfolio sort based on the informativeness of earnings announcements from Table 5. The P1-minus-P5

Table B.4: Portfolio Performance Based on Informativeness of Earnings Announcements: FOMC vs. Other Macro

	P1	P2	P3	P4	P5	P1−P5
Panel A: Other Macro days (342 days)						
EW β-neutral	16.26	9.22	6.55	1.86	−2.33	18.60
	(3.05)	(2.24)	(1.84)	(0.49)	(−0.41)	(2.39)
VW β-neutral	12.77	8.28	5.52	−3.49	−0.69	13.45
	(2.61)	(2.10)	(1.66)	(−1.00)	(−0.14)	(1.91)
Panel B: FOMC days (132 days)						
EW β-neutral	12.03	14.71	2.39	−8.69	−18.25	30.27
	(1.37)	(2.26)	(0.37)	(−1.61)	(−2.38)	(2.59)
VW β-neutral	16.95	5.96	−3.80	−7.44	−17.65	34.60
	(2.84)	(0.95)	(−0.81)	(−1.35)	(−2.34)	(3.60)

This table reports the performance of trading strategies based on the informativeness of earnings announcements, evaluated on macroeconomic announcement (MA) days and split by announcement type. On the trading day preceding each macroeconomic announcement, firms that announced earnings within the prior 15 trading days are sorted into five portfolios (P1–P5) according to β^{EA}, defined as the component of the firm's announcement-day beta in excess of its unconditional CAPM beta (estimated using Equation 23). Daily CAPM-neutral excess returns are computed by subtracting the firm's unconditional CAPM component (defined as the market return scaled by β_i^{CAPM}) from its realized daily excess return. Both equal-weighted (EW) and value-weighted (VW) CAPM-neutral excess returns (in basis points) are reported, with time-series t-statistics in parentheses. Panel A excludes FOMC days and includes only non-FOMC macroeconomic announcements (NFP, GDP, and ISM). Panel B restricts the sample to FOMC announcement days only.

spread is likewise positive and statistically significant in both subsamples. Overall, the repricing premium is not driven by FOMC days and is present across both FOMC and other macroeconomic announcements.

B.2.3 Excess Betas and Returns

On both earnings announcement days and macroeconomic announcement days, returns are driven in large part by firms' unconditional CAPM exposures. To isolate the repricing channel proposed in our model, we decompose intraday market exposure into an unconditional CAPM beta component and an excess beta component—β^{EA} on earnings announcement days and β^{MA} on macroeconomic announcement days—as described in Section 4.3.

We show that a higher excess beta is associated with higher contemporaneous returns on both types of announcement days. Column (1) of Table B.5 shows that on earnings announcement days, a one-standard-deviation increase in β^{EA} is associated with roughly 35 basis points higher daily excess returns. Column (2) shows that on macroeconomic announcement days, a one-standard-

deviation increase in β^{MA} is associated with approximately 37 basis points higher daily excess returns.

Because β^{EA} and β^{MA} are standardized to have mean zero and unit variance, the coefficients are directly comparable. The magnitude of the price of risk on macroeconomic announcement days is quantitatively similar to that on earnings announcement days. These findings show that the market prices announcement-specific exposure with the positive sign predicted by the model: higher excess beta is associated with higher contemporaneous returns on both earnings and macroeconomic announcement days.

Table B.5: Excess Returns and Announcement-Specific Risk

	(1) EA-day Exret	(2) MA-day Exret
β (standardized)	0.35	0.37
	(3.34)	(12.57)
N	241,168	3,298,766
R^2	0.115	0.167
Firm and Date FE	✓	✓

This table reports regressions of firm-level daily excess returns (in percentage points) on standardized β^{EA} and β^{MA}. Column (1) uses excess returns on earnings announcement (EA) days and relates returns to β^{EA}, while Column (2) uses excess returns on macro announcement (MA) days and relates returns to β^{MA}. Each excess-beta measure is the difference between the corresponding announcement-day beta and the firm's unconditional CAPM beta. The earnings-announcement excess beta is defined in Equation (23), and the macro-announcement excess beta is constructed analogously. All specifications include firm and date fixed effects. Parentheses report t-statistics based on standard errors double-clustered by firm and date. The sample covers CRSP, I/B/E/S, and TAQ from 1994 to 2024. Market equity is required to be at least \$10 million. The two-week beta requires at least 32 intraday observations. Returns and betas are winsorized at the 0.5th and 99.5th percentiles.

B.2.4 Informativeness of Earnings Announcements through Time

We further test whether the strength of the repricing channel on macroeconomic announcement days varies with the timing of the prior earnings announcement. As time passes, the information about aggregate conditions embedded in an earnings signal ($\theta + g$) becomes increasingly noisy as it is superseded by other news. Consequently, when a macroeconomic announcement eventually reveals the aggregate state, less repricing occurs for more stale announcers than for recent ones. This implies a less negative β^{MA} for firms with stale earnings news.

To test this prediction, on macroeconomic announcement days we regress β^{MA} on β^{EA}. Both

beta measures are standardized to have mean zero and unit variance, so the coefficients measure the change in standard deviations of β^{MA} associated with a one-standard-deviation increase in the informativeness of the earnings announcement. A negative coefficient indicates that firms with more informative earnings announcements experience stronger repricing on macroeconomic announcement days. To examine how this relation decays over time, we split the sample into recent announcers (earnings announced within the past week) and "stale announcers" (earnings announced between one week and one month earlier).

Table B.6: Regression of β^{MA} on β^{EA} on Macroeconomic Announcement Days

	(1) All EAs	(2) EA < 1 week	(3) EA 1 week–1 month
β^{EA} (standardized)	–0.14 (–27.69)	–0.32 (–44.92)	–0.08 (–21.22)
N	975,083	256,167	718,273
R^2	0.054	0.126	0.053
Firm and Date FE	✓	✓	✓

This table reports regressions of the standardized β^{MA} on the standardized β^{EA}. Each beta measure is the component of a firm's corresponding announcement-day beta in excess of its unconditional CAPM beta. The earnings-announcement excess beta is defined in Equation (23), and the macro-announcement excess beta is constructed analogously. Column (1) uses all earnings announcements, Column (2) restricts to cases in which the prior earnings announcement occurred within the past week, and Column (3) restricts to cases in which the prior earnings announcement occurred between one week and one month earlier. All specifications include firm and date fixed effects, and parentheses report t-statistics based on standard errors double-clustered by firm and date. The sample covers CRSP, I/B/E/S, and TAQ from 1994 to 2024. Financial firms (SIC 6000–6999) are excluded. Market equity is required to be at least \$10 million. Betas are winsorized at the 0.5th and 99.5th percentiles.

Table B.6 reports the regression results. The coefficients are negative and highly statistically significant across all specifications, consistent with the repricing mechanism. In the full sample, a one-standard-deviation increase in β^{EA} predicts a decline of approximately 0.14 standard deviations in β^{MA}. Conditioning on announcement timing reveals a clear gradient: the relation is strongest when earnings were announced within the past week, with a coefficient of -0.32, and attenuates when the earnings announcement occurred between one week and one month earlier, with a coefficient of -0.08.

To assess the economic magnitude, we relate daily excess returns on macroeconomic announcement days to β^{MA} using the regression $R^{ex}_{i,T} = \alpha + \gamma\, \beta^{\text{MA}}_{i,T} + \varepsilon_{i,T}$. The estimated slope coefficient γ is 11.8 bps and is highly significant. Since β^{MA} has a mean of –0.033 and a standard deviation of 1.86,

a one-standard-deviation increase in β^{MA} is associated with an increase of approximately 22 bps in daily excess returns (11.8×1.86). Combining this estimate with the coefficients above implies that, for firms with earnings announced within the past week, a one-standard-deviation increase in the informativeness of the prior earnings announcement (β^{EA}) corresponds to an implied decline of about 7 bps in daily excess returns on macroeconomic announcement days.

B.2.5 Belief Revision: Market Return Proxy

As a robustness check, we re-estimate the belief-revision specification in Section 4.5 using the demeaned market return on macroeconomic announcement days as an alternative proxy for macroeconomic surprises, instead of the standardized consensus forecast errors used in Table 7. This measure reflects the market's response to macroeconomic surprises, and a positive (negative) value indicates that the market perceives the macroeconomic news as positive (negative). Specifically, we estimate:

$$\mathrm{Rev}_{i,t} = \beta_1 \, \tilde{r}_{M,t} + \beta_2 \, (\mathrm{EA}_{i,t} \times \tilde{r}_{M,t}) + \beta_3 \, \mathrm{EA}_{i,t} + \chi_i + \delta_k + \varepsilon_{i,t}, \tag{B.1}$$

where $\tilde{r}_{M,t}$ is the one-day demeaned market return, defined as the market excess return minus its trailing 21-day mean, winsorized at the 1st and 99th percentiles.

Table B.7 reports the results. The benchmark coefficient β_1 is small and statistically insignificant (0.09, $t = 0.77$), indicating that average analyst revisions do not comove with market returns on macroeconomic announcement days after controlling for firm and event-type fixed effects. The interaction coefficient β_2 is negative and significant (-0.29, $t = -1.72$): for firms with recent earnings announcements, a positive market surprise on macro announcement days is associated with downward revisions in firm-specific EPS expectations relative to the benchmark response of non-announcers, consistent with the consensus-surprise results in Table 7 of the main text.

B.2.6 Analyst Forecast Revisions around Macroeconomic Announcements

If macroeconomic announcements trigger investors to reassess firm-specific information revealed in prior earnings news, belief revision activity should intensify on macroeconomic announcement days. We show that analysts' forecast revisions cluster on these days, that this activity is strongest

Table B.7: Belief Revision: Market Return Proxy

	$\text{Rev}_{i,t}$
β_1 (Benchmark)	0.09
	(0.77)
β_2 (EA $\times$ $\tilde{r}_{M,t}$)	−0.29
	(−1.72)
β_3 (EA level)	1.63
	(6.67)
Observations	185,808
R^2	0.155
Firm FE	✓
Event-type FE	✓
Cluster (firm, date)	✓

This table reports estimates of Equation (B.1). The dependent variable is the analyst EPS forecast revision, defined as the difference between the analyst's forecast and that analyst's own previous forecast for firm i for the same fiscal year, scaled by the absolute value of actual EPS and multiplied by 100. The market-implied macro surprise is $\tilde{r}_{M,t}$, the 1-day market excess return on the macroeconomic announcement day minus its trailing 21-day mean, winsorized at the 1st and 99th percentiles. $\text{EA}_{i,t} = 1$ if the firm announced earnings during the 30 days before the MA day. The sample consists of GDP, NFP, ISM, and FOMC announcement days from 1994 through 2024. t-statistics based on standard errors clustered two ways by firm and date are in parentheses.

for firms with very recent earnings announcements, and that it attenuates as earnings information becomes more distant.

As a first test, we perform a time-series analysis of forecast revisions around macroeconomic announcement days. Results are displayed in Table B.8. For each trading day in our sample, we construct three measures of analyst belief revision activity: (i) the average number of forecast revisions per revised firm, (ii) the total number of revisions across all firms, and (iii) the number of distinct firms experiencing at least one revision. We then regress each outcome on indicators for macro announcement days, as well as the preceding trading day (MA−1) and the following trading day (MA+1), controlling for day-of-week effects following DellaVigna and Pollet (2009). Robust standard errors are used throughout.

Table B.8 shows that analyst activity responds sharply to macroeconomic announcements. Column (1) indicates an increase of approximately 0.05 additional revisions per firm on macroeconomic announcement days, with no significant change on adjacent days. Column (2) confirms this pattern in the aggregate: macroeconomic announcement days are associated with roughly 51 additional forecast revisions across the cross section, while MA-1 and MA+1 show no effect. Finally, Column

(3) shows that the number of distinct firms experiencing revisions rises by about 19 on macroeconomic announcement days, again with no significant change on neighboring days. Together, these results indicate that analysts actively update firm-level expectations in response to macroeconomic news.

Table B.8: Belief Updates on Macroeconomic Announcement Days

	(1) Avg Revisions/ Rev Firm ×100	(2) Total Revisions	(3) # Revised Firms
MA day	4.70	51.10	18.84
	(3.74)	(4.50)	(4.12)
MA+1 day	2.20	17.34	5.94
	(1.37)	(1.18)	(1.02)
MA−1 day	1.10	21.65	8.26
	(0.87)	(1.81)	(1.61)
Constant	130.40	322.30	236.30
	(241.10)	(49.56)	(60.96)
Observations	6,765	6,765	6,765
R^2	0.121	0.024	0.006
DOW controls	✓	✓	✓

This table reports regressions of analyst forecast revision activity on indicators for macroeconomic announcement (MA) days. The dependent variables are: (1) the average number of forecast revisions per revised firm, (2) the total number of revisions across firms, and (3) the number of distinct firms with at least one revision. The regressors include indicators for the macroeconomic announcement day, the day before (MA−1), and the day after (MA+1). All specifications include day-of-week fixed effects, and robust t-statistics are reported in parentheses. The sample covers the intersection of CRSP, I/B/E/S, TAQ, and Compustat from 1994 to 2024.

We next estimate a firm-day-level probit model in which the dependent variable equals one if at least one analyst revises a firm's earnings forecast on a given day. For each firm, the time series begins on the first date the firm appears in I/B/E/S and ends on its last recorded forecast date. The dependent variable is set to one whenever at least one revision occurs on a firm-day, regardless of the number of updates. This approach prevents the results from being disproportionately driven by firms that mechanically receive many revisions on a single day.

The key regressors include an indicator for macroeconomic announcement days and indicators for the recency of the most recent earnings announcement. The estimation sample contains approximately 25 million firm-day observations. As reported in Table B.9, analysts are significantly more likely to revise forecasts on macroeconomic announcement days even after conditioning on firm-level earnings events, confirming that the increase in belief updating is not mechanically driven by contemporaneous or recent earnings announcements.

Table B.9: Probit Model of Forecast Revisions and Marginal Effects

	Probit Coefficients		Average Marginal Effects	
Variable	Estimate	(z-stat)	dy/dx	(z-stat)
MA day indicator	0.16	(153.80)	0.01	(144.60)
EA within 0–1 days	1.52	(930.10)	0.35	(589.10)
EA within 2–5 days	0.46	(242.80)	0.06	(184.80)
EA within 6–10 days	0.00	(–0.24)	0.00	(–0.24)
EA within 11–50 days	–0.19	(–182.20)	–0.02	(–186.80)
Constant	–1.78	(–2462.00)	—	—
Observations	25,651,008		25,651,008	
Pseudo R^2	0.110			

This table reports probit regressions in which the dependent variable equals one if at least one analyst revises an earnings forecast for firm i on day t. For each firm, the time series begins on the first day the firm appears in the I/B/E/S database and ends on the last day for which I/B/E/S data are available. The regressors include an indicator for scheduled macroeconomic announcement (MA) days and indicators for the recency of the firm's most recent earnings announcement (EA): within 0–1 days, 2–5 days, 6–10 days, and 11–50 days. Columns labeled "Probit Coefficients" report coefficient estimates from the probit model, with z-statistics in parentheses. Columns labeled "Average Marginal Effects" report the average change in the probability of a forecast revision associated with a one-unit change in each regressor, with corresponding z-statistics in parentheses. The sample covers the intersection of CRSP, I/B/E/S, TAQ, and Compustat from 1994 to 2024.

The estimated marginal effects indicate that macroeconomic announcement days raise the probability of at least one analyst revision by approximately 1 percentage point, even after conditioning on the timing of earnings announcements. This increase is economically meaningful, given that the information released is not firm-specific. By comparison, earnings announcement days, when firm-level information is directly revealed, generate a much larger increase in revision activity of roughly 35 percentage points. Thus, macroeconomic announcements independently prompt belief updating beyond what is explained by contemporaneous or recent earnings announcements.

Finally, the earnings announcement recency indicators exhibit a clear gradient: analyst revisions are most likely when the most recent earnings announcement occurred within the prior few days and decline steadily as the announcement becomes more distant. This pattern indicates that newer firm-specific information elicits stronger belief revision, whereas its influence attenuates over time. Taken together, these results show that the surge in analyst revisions on macroeconomic announcement days cannot be attributed solely to nearby earnings news. Instead, macroeconomic announcement days are associated with additional belief updating.

Appendix C: Numerical Solutions

C.1 Solve for the H Function

We use a finite-difference method to solve for the value function. The HJB equation can be rewritten as follows:

$$(1-\gamma)\left(\frac{\rho}{1-\frac{1}{\psi}}-\hat{\theta}_t+\frac{1}{2}\gamma\sigma_C^2\right)H=H_t+H_\theta\left[a\left(\bar{\theta}-\hat{\theta}_t\right)+(1-\gamma)\,q_{\theta\theta}\right]+\frac{1}{2}H_{\theta\theta}\frac{q_{\theta\theta}^2}{\sigma_C^2}+\frac{\rho\,(1-\gamma)}{1-\frac{1}{\psi}}H^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}}.$$

We use the finite-difference method to approximate the function $H\left(\hat{\theta}_t,t\right)$ at I discrete points $\hat{\theta}_i$, $i=1,2,...,I$, in the state dimension. Denote $H_i^n=H\left(\hat{\theta}_i,t^n\right)$, where n indexes time. Denote

$$\beta_i = (1-\gamma)\left(\frac{\rho}{1-\frac{1}{\psi}}-\hat{\theta}_i+\frac{1}{2}\gamma\sigma_C^2\right), \tag{C.1}$$

$$u_i^{n+1} = \frac{\rho\,(1-\gamma)}{1-\frac{1}{\psi}}\left(H_i^{n+1}\right)^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}}. \tag{C.2}$$

We use an implicit method to update the value function.

$$\begin{aligned}\beta_i H_i^n = {} & \frac{H_i^{n+1}-H_i^n}{\Delta t}+u_i^{n+1}+\frac{1}{2}\partial_{\theta\theta}H_i^n\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2 \\ & +\partial_{\theta,F}H_i^n\left[a\left(\bar{\theta}-\hat{\theta}_i\right)+(1-\gamma)\,q_{\theta\theta}^n\right]^+ +\partial_{\theta,B}H_i^n\left[a\left(\bar{\theta}-\hat{\theta}_i\right)+(1-\gamma)\,q_{\theta\theta}^n\right]^-.\end{aligned}$$

We use an upwind scheme to approximate the derivatives $\partial_\theta H_i^n$ and $\partial_{\theta\theta}H_i^n$,

$$\begin{aligned}\beta_i H_i^n = {} & \frac{H_i^{n+1}-H_i^n}{\Delta t}+u_i^{n+1}+\frac{1}{2}\frac{H_{i+1}^n-2H_i^n+H_{i-1}^n}{\left(\Delta\hat{\theta}\right)^2}\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2 \\ & +\frac{H_{i+1}^n-H_i^n}{\Delta\hat{\theta}}\left[a\left(\bar{\theta}-\hat{\theta}_i\right)+(1-\gamma)\,q_{\theta\theta}^n\right]^+ +\frac{H_i^n-H_{i-1}^n}{\Delta\hat{\theta}}\left[a\left(\bar{\theta}-\hat{\theta}_i\right)+(1-\gamma)\,q_{\theta\theta}^n\right]^-.\end{aligned}$$

Collecting terms and rewriting the HJB equation,

$$\beta_i H_i^n = \frac{H_i^{n+1}-H_i^n}{\Delta t}+u_i^{n+1}+H_{i-1}^n x_i^n+H_i^n y_i^n+H_{i+1}^n z_i^n \tag{C.3}$$

where

$$x_i^n = -\frac{\left[a\left(\bar{\theta}-\hat{\theta}_i\right)+(1-\gamma)\,q_{\theta\theta}^n\right]^-}{\Delta\hat{\theta}}+\frac{1}{2\left(\Delta\hat{\theta}\right)^2}\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2 \tag{C.4}$$

$$y_i^n = -\frac{\left[a\left(\bar{\theta}-\hat{\theta}_i\right)+(1-\gamma)\,q_{\theta\theta}^n\right]^+}{\Delta\hat{\theta}}+\frac{\left[a\left(\bar{\theta}-\hat{\theta}_i\right)+(1-\gamma)\,q_{\theta\theta}^n\right]^-}{\Delta\hat{\theta}}-\frac{1}{\left(\Delta\hat{\theta}\right)^2}\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2 \tag{C.5}$$

$$z_i^n = \frac{\left[a\left(\bar{\theta}-\hat{\theta}_i\right)+(1-\gamma)\,q_{\theta\theta}^n\right]^+}{\Delta\hat{\theta}}+\frac{1}{2\left(\Delta\hat{\theta}\right)^2}\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2 \tag{C.6}$$

Rewriting in matrix notation,

$$\beta H^n = u^{n+1}+\mathbf{A}^n H^n+\frac{H^{n+1}-H^n}{\Delta t}, \tag{C.7}$$

where

$$\mathbf{A}^n=\begin{bmatrix} \tilde{y}_1^n & z_1^n & 0 & \cdots & 0\\ x_2^n & y_2^n & z_2^n & 0 & \vdots\\ 0 & x_3^n & y_3^n & z_3^n & \vdots\\ \vdots & \ddots & \ddots & \ddots & \ddots\\ 0 & \cdots & 0 & x_I^n & \tilde{y}_I^n \end{bmatrix}, H^n=\begin{bmatrix} H_1^n\\ H_2^n\\ H_3^n\\ \vdots\\ H_I^n \end{bmatrix}, \beta=\begin{bmatrix} \beta_1 & 0 & & & \cdots\\ 0 & \beta_2 & & & \\ & & \beta_3 & & \\ & & & \ddots & 0\\ \vdots & & & & \beta_I \end{bmatrix}, u^{n+1}=\begin{bmatrix} u_1^{n+1}\\ u_2^{n+1}\\ u_3^{n+1}\\ \vdots\\ u_I^{n+1} \end{bmatrix}.$$

The boundary entries $\tilde{y}_1^n$ and $\tilde{y}_I^n$ are defined below. The system can be written as

$$\mathbf{B}^n H^n = b^n,\ \mathbf{B}^n=\frac{1}{\Delta t}\mathbf{I}+\beta-\mathbf{A}^n,\ b^n=u^{n+1}+\frac{1}{\Delta t}H^{n+1}. \tag{C.8}$$

Boundary conditions for H We have three sets of boundary conditions: grid boundaries in $\hat{\theta}$, the earnings announcement at τ, and the macroeconomic announcement at T.

Grid boundaries. We impose reflecting boundary conditions $H_0^n = H_1^n$ and $H_{I+1}^n = H_I^n$. Substituting into the finite difference equation at $i = 1$ and $i = I$, the diagonal entries at the boundaries

become

$$\begin{aligned}\tilde{y}_1^n &= y_1^n + x_1^n,\\ \tilde{y}_I^n &= y_I^n + z_I^n,\end{aligned}$$

so that the points outside the grid are absorbed into the diagonal. This ensures that every row of $\mathbf{A}^n$ sums to zero.

Earnings announcement. After the earnings announcement,

$$H\left(\hat{\theta}_\tau^-, \tau^-\right) = \mathbb{E}\left[H\left(\hat{\theta}_\tau^+, \tau^+\right) \mid \hat{\theta}_\tau^-, \tau^-\right] = \int_{-\infty}^{+\infty} H\left(\hat{\theta}_\tau^+, \tau^+\right) \phi_1\left(\hat{\theta}_\tau^+\right) d\hat{\theta}_\tau^+,$$

where $\phi_1\left(\hat{\theta}_\tau^+\right)$ is the density of the normal distribution and $\hat{\theta}_\tau^+ \sim \mathcal{N}\left(\hat{\theta}_\tau^-, \underbrace{q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau)}_{\text{EA variance drop}}\right)$. With N firms announcing at τ, the aggregate posterior variance $q_{\theta\theta}^+(\tau)$ is $q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)}{1+q_{\theta\theta}^-(\tau)\,\bar{s}_\Sigma}$, $\bar{s}_\Sigma \equiv \sum_{i=1}^N v_i$, $v_i \equiv \frac{1}{q_{ii}^-(\tau)+\sigma_{E,i}^2(\tau)}$. (If only a subset announces at τ, the sum runs over that subset.) Hence the one-dimensional variance inside the EA integral is: $q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)^2 \bar{s}_\Sigma}{1+q_{\theta\theta}^-(\tau)\bar{s}_\Sigma}$.

Macroeconomic announcement. After the macro announcement at T, the boundary condition is

$$H\left(\hat{\theta}_T^-, T^-\right) = \mathbb{E}\left[H\left(\hat{\theta}_T^+, T^+\right) \mid \hat{\theta}_T^-, T^-\right] = \int_{-\infty}^{+\infty} H\left(\hat{\theta}_T^+, T^+\right) \phi_1\left(\hat{\theta}_T^+\right) d\hat{\theta}_T^+,$$

where $\phi_1\left(\hat{\theta}_T^+\right)$ is the density of the normal distribution and $\hat{\theta}_T^+ \sim \mathcal{N}\left(\hat{\theta}_T^-, q_{\theta\theta}^-(T)\right)$, which is equivalent to $\hat{\theta}_T^+ \sim \mathcal{N}\left(\hat{\theta}_T^-, q_{\theta\theta}^+(\tau)\right)$ since $q_{\theta\theta}^+(T) = 0$. We use Gaussian quadrature to approximate the normal density. Note that H does not depend on the realization of $\sigma_{E,i}(\tau)$ and is therefore the same across all firms.

C.2 Solve for the Price-to-Dividend Ratio

By Lemma A.4, for each initial condition q_0 the price-to-dividend ratio $p(\hat{\theta}_t, \hat{g}_{i,t}, t; q_0)$ satisfies the PDE (A.47).

Between announcements, $q_{ii}(t; q_0)$ is deterministic (solves a Riccati ODE), so the state can

be written as $p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii}(t;q_0), t)$; here only $\hat{\theta}_t, \hat{g}_{i,t}$ are stochastic. We define $\tilde{p}(\hat{\theta}_t, \hat{g}_{i,t}, t; q_0) = p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii}(t;q_0), t)$. Note that

$$\begin{aligned}\tilde{p}_t\left(\hat{\theta}_t, \hat{g}_{i,t}, t; q_0\right) &= \frac{\partial}{\partial q_{ii}} p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii}\left(t;q_0\right), t\right) \frac{\partial q_{ii}}{\partial t} + p_t\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii}\left(t;q_0\right), t\right) \\ &= \frac{\partial}{\partial q_{ii}} p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii}\left(t;q_0\right), t\right) \zeta\left(q_{ii}\right) + p_t\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii}\left(t;q_0\right), t\right)\end{aligned}$$

by the Riccati equation. Equivalently, the original p_q term has been absorbed into $\tilde{p}_t$ by the chain rule, reducing the PDE dimension from $\left(\hat{\theta}, \hat{g}_i, q_{ii}, t\right)$ to $\left(\hat{\theta}, \hat{g}_i, t\right)$. The price-to-dividend ratio therefore satisfies the two-state PDE

$$\varpi\left(\hat{\theta}_t, \hat{g}_{i,t}, t\right)\tilde{p} = 1 + \tilde{p}_t + \tilde{p}_\theta \varrho\left(\hat{\theta}_t, t\right) + \tilde{p}_g \vartheta\left(\hat{g}_{i,t}, q_{ii}, t\right) + \frac{1}{2}\tilde{p}_{\theta\theta}\frac{q_{\theta\theta}^2}{\sigma_C^2} + \frac{1}{2}\tilde{p}_{gg}\frac{q_{ii}^2}{\sigma_D^2} \tag{C.9}$$

in $(\hat{\theta}, \hat{g}_i)$ alone, solved independently for each q_0.

We discretize $(\hat{\theta}, \hat{g}_i)$ on $I \times J$ grid points $\hat{\theta}_i$ $(i = 1, \ldots, I)$ and $\hat{g}_j$ $(j = 1, \ldots, J)$, with K initial conditions $q_0^{(k)}$ $(k = 1, \ldots, K)$. For a given $q_0^{(k)}$, denote $p_{i,j}^n = p(\hat{\theta}_i, \hat{g}_j, t^n; q_0^{(k)})$ and $q^n = q_{ii}(t^n; q_0^{(k)})$. The discretized coefficients are

$$\begin{aligned}\varpi_{i,j}^n &= -\hat{g}_j - \left(1 - \frac{1}{\psi}\right)\hat{\theta}_i + \rho + \frac{1}{2}\gamma\left(1 - \frac{1}{\psi}\right)\sigma_C^2 + \frac{\left(\frac{1}{\psi} - \gamma\right)\left(1 - \frac{1}{\psi}\right)}{2\left(1-\gamma\right)^2}\left(\frac{H_{\theta,i}^n}{H_i^n}\right)^2\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2 \\ \varrho_i^n &= a\left(\bar{\theta} - \hat{\theta}_i\right) + \left(1-\gamma\right)q_{\theta\theta}^n + \frac{\frac{1}{\psi} - \gamma}{1-\gamma}\frac{H_{\theta,i}^n}{H_i^n}\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2 \\ \vartheta_j^n &= b\left(\bar{g} - \hat{g}_j\right) + q^n\end{aligned}$$

The implicit upwind scheme reads

$$\begin{aligned}\varpi_{i,j}^n p_{i,j}^n &= \frac{p_{i,j}^{n+1} - p_{i,j}^n}{\Delta t} + 1 + \frac{p_{i+1,j}^n - 2p_{i,j}^n + p_{i-1,j}^n}{2\left(\Delta\hat{\theta}\right)^2}\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2 + \frac{p_{i,j+1}^n - 2p_{i,j}^n + p_{i,j-1}^n}{2\left(\Delta\hat{g}\right)^2}\left(\frac{q^n}{\sigma_D}\right)^2 \\ &\quad + \frac{p_{i+1,j}^n - p_{i,j}^n}{\Delta\hat{\theta}}\left(\varrho_i^n\right)^+ + \frac{p_{i,j}^n - p_{i-1,j}^n}{\Delta\hat{\theta}}\left(\varrho_i^n\right)^- + \frac{p_{i,j+1}^n - p_{i,j}^n}{\Delta\hat{g}}\left(\vartheta_j^n\right)^+ \\ &\quad + \frac{p_{i,j}^n - p_{i,j-1}^n}{\Delta\hat{g}}\left(\vartheta_j^n\right)^-\end{aligned}$$

Collecting terms,

$$\varpi_{i,j}^n p_{i,j}^n = \frac{p_{i,j}^{n+1} - p_{i,j}^n}{\Delta t} + 1 + p_{i-1,j}^n x_i^n + p_{i,j}^n y_{i,j}^n + p_{i+1,j}^n z_i^n + p_{i,j-1}^n \chi_j^n + p_{i,j+1}^n \lambda_j^n,$$

where, letting $\alpha_\theta^n \equiv \frac{1}{2(\Delta\hat{\theta})^2}\left(\frac{q_{\theta\theta}^n}{\sigma_C}\right)^2$ and $\alpha_g^n \equiv \frac{1}{2(\Delta\hat{g})^2}\left(\frac{q^n}{\sigma_D}\right)^2$,

$$\begin{aligned} x_i^n &= -\frac{(\varrho_i^n)^-}{\Delta\hat{\theta}} + \alpha_\theta^n, \qquad z_i^n = \frac{(\varrho_i^n)^+}{\Delta\hat{\theta}} + \alpha_\theta^n, \\ \chi_j^n &= -\frac{(\vartheta_j^n)^-}{\Delta\hat{g}} + \alpha_g^n, \qquad \lambda_j^n = \frac{(\vartheta_j^n)^+}{\Delta\hat{g}} + \alpha_g^n, \\ y_{i,j}^n &= -x_i^n - z_i^n - \chi_j^n - \lambda_j^n. \end{aligned}$$

In matrix notation, with p^n the $IJ \times 1$ vector for the current $q_0^{(k)}$,

$$\mathbf{B}^n p^n = b^n, \quad \mathbf{B}^n = \frac{1}{\Delta t}\mathbf{I} + \mathrm{diag}(\varpi^n) - \mathbf{A}^n, \quad b^n = \mathbf{1} + \frac{1}{\Delta t} p^{n+1}.$$

This $IJ \times IJ$ system is solved independently for each $q_0^{(k)}$, $k = 1, \ldots, K$.

Boundaries Because the problem for each q_0 is solved independently on the $(\hat{\theta}, \hat{g})$ grid, boundary conditions are imposed only in the $\hat{\theta}$ and $\hat{g}$ directions—no finite-difference approximation is needed in the q direction. We impose reflecting boundary conditions on both state variables. We impose the zero-slope conditions $\partial p/\partial\hat{\theta} = 0$ and $\partial p/\partial\hat{g} = 0$ at the $\hat{\theta}$ and $\hat{g}$ boundaries, respectively, enforced by adjusting the edge coefficients: at the lower $\hat{\theta}$ boundary, the lower off-diagonal coefficient is absorbed into the center diagonal,

$$\tilde{y}_{1,j}^n = y_{1,j}^n + x_1^n, \qquad x_1^n = 0, \qquad \forall\, j;$$

at the upper $\hat{\theta}$ boundary,

$$\tilde{y}_{I,j}^n = y_{I,j}^n + z_I^n, \qquad z_I^n = 0, \qquad \forall\, j.$$

The same adjustment is applied in the $\hat{g}$ direction: at $j = 1$, the edge coefficient χ_1^n (which would point to the nonexistent $j = 0$ block) is absorbed into the center diagonal; at $j = J$, the edge

coefficient λ_J^n (which would point to $j = J + 1$) is absorbed into the center diagonal. After these adjustments, every row of $\mathbf{A}^n$ sums to zero.

The solution vector for each q_0 is $p^n \in \mathbb{R}^{IJ}$, stacked as

$$p^n = \left[p_{1,1}^n, \ldots, p_{I,1}^n;\ \ldots;\ p_{1,J}^n, \ldots, p_{I,J}^n\right]^\top.$$

The transition matrix $\mathbf{A}^n \in \mathbb{R}^{IJ \times IJ}$ decomposes as

$$\mathbf{A}^n = \mathbf{A}_\theta^n + \mathbf{B}_g^n.$$

$\mathbf{A}_\theta^n$ is block-diagonal in j, with each j-block $\mathbf{T}_j^n \in \mathbb{R}^{I \times I}$ tridiagonal:

$$(\mathbf{T}_j^n)_{i,i-1} = x_i^n, \quad (\mathbf{T}_j^n)_{i,i} = y_{i,j}^n, \quad (\mathbf{T}_j^n)_{i,i+1} = z_i^n,$$

with the outward entries set to zero at $i = 1$ and $i = I$ after the edge-coefficient adjustment described above. $\mathbf{B}_g^n$ is block-tridiagonal across j-blocks, with diagonal $I \times I$ blocks on its first block sub- and superdiagonals:

$$(\mathbf{B}_g^n)_{j,j-1} = \chi_j^n \mathbf{I}_I, \qquad (\mathbf{B}_g^n)_{j,j+1} = \lambda_j^n \mathbf{I}_I,$$

and the reflecting-BC corrections on the center-diagonal blocks for $j = 1$ and $j = J$.

Reducing the boundary conditions to the q_0 parameterization The interior PDE is solved as a family of two-dimensional problems parameterized by q_0. The same reduction applies at the announcement boundaries. In the original formulation the boundary conditions involve $p(\hat{\theta}^+, \hat{g}_i^+, q_{ii}^+, t^+)$; in the q_0 parameterization this becomes $p(\hat{\theta}^+, \hat{g}_i^+, t^+; q_0)$, but the mapping from the post-announcement q_{ii}^+ back to the initial condition q_0 depends on which boundary is crossed.

Recall the informativeness index for firm i at the earnings announcement:

$$\alpha_i(\tau) \equiv \frac{q_{ii}^-(\tau; q_0)}{q_{ii}^-(\tau; q_0) + \sigma_{E,i}^2(\tau)}. \tag{C.10}$$

EA boundary. At the earnings announcement, $\tau^+ = T^-$ lies within the same announcement cycle, so the q_0 label is unchanged. The EA changes q_{ii} from $q_{ii}^-(\tau)$ to $q_{ii}^+(\tau)$. Therefore $p(\hat{\theta}^+, \hat{g}_i^+, q^+, \tau^+)$ maps directly to $p(\hat{\theta}^+, \hat{g}_i^+, \tau^+; q_0)$ at the same q_0—no q_0-grid interpolation is needed. The $\Delta\Sigma_{E,i}$ matrix and the two-dimensional Gauss-Hermite quadrature carry over unchanged from the formulas below.

MA boundary. At the macroeconomic announcement the cycle resets. Because $T^- = \tau^+$, the state at T^- depends on the firm's EA signal variance $\sigma_{E,i}(\tau)$ through $\alpha_i(\tau)$. The $\Delta\Sigma_{M,i}$ matrix (derived below) has rank one, so $\hat{g}_i^+(T) = \hat{g}_i^-(T) - \alpha_i(\tau)(\hat{\theta}_T^+ - \hat{\theta}_T^-)$ is deterministic given $\hat{\theta}_T^+$, and the two-dimensional integral collapses to a one-dimensional integral over $\hat{\theta}^+ \sim \mathcal{N}(\hat{\theta}_T^-, q_{\theta\theta}^+(\tau))$. The post-MA variance $q_0' = (1-\alpha_i(\tau))\, q_{ii}^-(\tau; q_0)$ becomes the initial condition for the next cycle. Because generically $q_0' \neq q_0$, the evaluation $p(\hat{\theta}^+, \hat{g}_i^+, T^+; q_0')$ requires interpolation over the q_0-grid. Note that both q_0' and the deterministic $\hat{g}$-map depend on $\sigma_{E,i}(\tau)$ through $\alpha_i(\tau)$, so different firm types map to different q_0' values.

In summary, within one announcement cycle q_0 is updated as follows:

$$q_0 \xrightarrow{\text{Riccati}} q_{ii}^-(\tau; q_0) \xrightarrow{\text{EA (same } q_0)} q_{ii}^+(\tau; q_0) \xrightarrow{\text{MA (new } q_0')} q_0' = (1 - \alpha_i(\tau))\, q_{ii}^-(\tau; q_0).$$

The price-to-dividend function is computed as the solution of a fixed-point problem in $p(\hat{\theta}, \hat{g}_i, \cdot\,; q_0)$, solved simultaneously over the whole q_0-grid.

Boundary conditions for P/D For an event at time $t_{\text{evt}} \in \{\tau, T\}$ and a focal firm i, the pre-event state is $(\hat{\theta}^-, \hat{g}_i^-)$. Define the event-time variance drop for firm i by

$$\Delta\Sigma_{t_{\text{evt}},i} = \begin{bmatrix} \Delta q_{\theta\theta}(t_{\text{evt}}) & \Delta q_{\theta g_i}(t_{\text{evt}}) \\ \Delta q_{\theta g_i}(t_{\text{evt}}) & \Delta q_{ii}(t_{\text{evt}}) \end{bmatrix} = \begin{bmatrix} q_{\theta\theta}^-(t_{\text{evt}}) - q_{\theta\theta}^+(t_{\text{evt}}) & q_{\theta g_i}^-(t_{\text{evt}}) - q_{\theta g_i}^+(t_{\text{evt}}) \\ q_{\theta g_i}^-(t_{\text{evt}}) - q_{\theta g_i}^+(t_{\text{evt}}) & q_{ii}^-(t_{\text{evt}}) - q_{ii}^+(t_{\text{evt}}) \end{bmatrix}.$$

This matrix is positive semidefinite. Also define $B = \frac{\frac{1}{\psi} - \gamma}{1 - \gamma}$. As before, denote by ϕ the joint normal density, ϕ_1 the marginal for $\hat{\theta}^+$, and ϕ_2 the conditional for $\hat{g}_i^+ \mid \hat{\theta}^+$.

After the macroeconomic announcement at T (fully revealing) *Fully revealing simplification.* With $T^- = \tau^+$, we have $q^+_{\theta\theta}(T) = 0$ and $q^+_{\theta g_i}(T) = 0$. Using the N-firm EA identities at τ, $q^+_{\theta\theta}(\tau) = \dfrac{q^-_{\theta\theta}(\tau)}{1 + q^-_{\theta\theta}(\tau)\bar{s}_\Sigma}$, $\alpha_i(\tau) = \frac{q^-_{ii}(\tau)}{q^-_{ii}(\tau)+\sigma^2_{E,i}(\tau)}$, $\bar{s}_\Sigma = \sum_{j=1}^N \frac{1}{q^-_{jj}(\tau)+\sigma^2_{E,j}(\tau)}$. The macro variance drop is $\begin{pmatrix} \hat{\theta}^+(T) \\ \hat{g}^+_i(T) \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} \hat{\theta}^-(T) \\ \hat{g}^-_i(T) \end{pmatrix}, \Delta\Sigma_{M,i} \right)$, and

$$\Delta\Sigma_{M,i} = \begin{pmatrix} \Delta q_{\theta\theta}(T) & \Delta q_{\theta g_i}(T) \\ \Delta q_{\theta g_i}(T) & \Delta q_{ii}(T) \end{pmatrix} = \begin{pmatrix} q^+_{\theta\theta}(\tau) & -\alpha_i(\tau) q^+_{\theta\theta}(\tau) \\ -\alpha_i(\tau) q^+_{\theta\theta}(\tau) & \alpha^2_i(\tau) q^+_{\theta\theta}(\tau) \end{pmatrix}, \tag{C.11}$$

i.e., $\Delta q_{\theta\theta}(T) = q^+_{\theta\theta}(\tau)$, $\Delta q_{\theta g_i}(T) = q^+_{\theta g_i}(\tau) = -\alpha_i(\tau) q^+_{\theta\theta}(\tau)$, $\Delta q_{ii}(T) = q^-_{ii}(T) - q^+_{ii}(T) = q^+_{ii}(\tau) - q^+_{ii}(T) = \alpha^2_i(\tau) q^+_{\theta\theta}(\tau)$.

The integral reduces to one dimension. Conditional on $\hat{\theta}^+(T)$, the conditional variance of $\hat{g}^+_i(T)$ is zero:

$$\hat{g}^+_i(T) = \hat{g}^-_i(T) - \alpha_i(\tau)\big(\hat{\theta}^+_T - \hat{\theta}^-_T\big). \tag{C.12}$$

Hence the joint Gaussian integral over $(\hat{\theta}^+, \hat{g}^+_i)$, i.e., $\iint(\cdot)\,\phi(\cdot)$ collapses to a one-dimensional integral over $\hat{\theta}^+ \sim \mathcal{N}\big(\hat{\theta}^-_T, q^+_{\theta\theta}(\tau)\big)$.

We assume σ_E has a discrete support $\{\sigma_{E,n}\}_{n=1}^N$ and probabilities $\{prob_n\}_{n=1}^N$ (e.g., a uniform distribution with each $\sigma_{E,n}$ having probability $1/N$). Recent announcers draw their noise types from the N quantiles of F_E each cycle; the averages below run over these types, and a non-announcer's boundary value is its own single-type $p\,(\sigma_E \to \infty; \cdot)$.

We compute the boundary condition in two steps.

- Step 1. Condition on a realization of σ_E.

  We draw N values $\{\sigma_{E,1}, \ldots, \sigma_{E,N}\}$ from F_E and assign them to firms by random permutation. Investors know the distribution F_E, so they can update their beliefs about the associated distribution of $\hat{g}^+_i(T)$ according to Equation (C.11), conditioning on a given draw $\sigma_{E,i}(\tau)$. It

is useful to denote this intermediate step as:

$$\begin{aligned} p\left(\sigma_{E,i}(\tau);\hat{\theta}_T^-,\hat{g}_{i,T}^-,T^-;q_0\right) &= \mathbb{E}\left[\left.\frac{H\left(\hat{\theta}_T^+,T^+\right)^B p\left(\hat{\theta}_T^+,\hat{g}_{i,T}^+,T^+;q_0'\right)}{\left(\mathbb{E}\left[H\left(\hat{\theta}_T^+,T^+\right)\mid\hat{\theta}_T^-,T^-\right]\right)^B}\right|\sigma_{E,i}(\tau);\hat{\theta}_T^-,\hat{g}_{i,T}^-,T^-;q_0\right] \\ &= \frac{\int_{-\infty}^{+\infty} H\left(\hat{\theta}_T^+,T^+\right)^B p\left(\hat{\theta}_T^+,\hat{g}_{i,T}^+(\hat{\theta}_T^+),T^+;q_0'\right)\phi_1\left(\hat{\theta}_T^+\middle|\hat{\theta}_T^-,q_{\theta\theta}^+(\tau)\right)d\hat{\theta}_T^+}{\left[\int_{-\infty}^{+\infty} H\left(\hat{\theta}_T^+,T^+\right)\phi_1\left(\hat{\theta}_T^+\middle|\hat{\theta}_T^-,q_{\theta\theta}^+(\tau)\right)d\hat{\theta}_T^+\right]^B} \\ &= \frac{\int e^{B\ln H\left(\hat{\theta}_T^+,T^+\right)+\ln p\left(\hat{\theta}_T^+,\hat{g}_{i,T}^+(\hat{\theta}_T^+),T^+;q_0'\right)}\phi_1\left(\hat{\theta}_T^+\middle|\hat{\theta}_T^-,q_{\theta\theta}^+(\tau)\right)d\hat{\theta}_T^+}{\left[\int e^{\ln H\left(\hat{\theta}_T^+,T^+\right)}\phi_1\left(\hat{\theta}_T^+\middle|\hat{\theta}_T^-,q_{\theta\theta}^+(\tau)\right)d\hat{\theta}_T^+\right]^B} \end{aligned}$$

- Step 2. Average over the heterogeneity in σ_E.

  We compute the unconditional expectation by averaging over all possible realizations of σ_E. This step allows us to derive the expected price-to-dividend ratio based on the information set $\left\{\hat{\theta}_T^-,\hat{g}_{i,T}^-,T^-;q_0\right\}$ right before the announcement. This gives

$$\begin{aligned} p\left(\hat{\theta}_T^-,\hat{g}_{i,T}^-,T^-;q_0\right) &= \mathbb{E}\left[p\left(\sigma_{E,i}(\tau);\hat{\theta}_T^-,\hat{g}_{i,T}^-,T^-;q_0\right)\middle|\hat{\theta}_T^-,\hat{g}_{i,T}^-,T^-;q_0\right] \\ &= \sum_{n=1}^{N} prob_n p\left(\sigma_{E,n};\hat{\theta}_T^-,\hat{g}_{i,T}^-,T^-;q_0\right). \end{aligned}$$

Similarly, at the earnings announcement at τ With N firms announcing at τ, let

$$d_i \equiv q_{ii}^-(\tau)+\sigma_{E,i}^2(\tau), \qquad v_i \equiv \frac{1}{d_i}, \qquad \bar{s}_\Sigma \equiv \sum_{i=1}^{N} v_i, \qquad \alpha_i(\tau) \equiv \frac{q_{ii}^-(\tau)}{d_i}.$$

The common-factor posterior variance is $q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)}{1+q_{\theta\theta}^-(\tau)\,\bar{s}_\Sigma}$. The post-announcement posterior means satisfy $\begin{pmatrix}\hat{\theta}^+(\tau)\\ \hat{g}_i^+(\tau)\end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix}\hat{\theta}^-(\tau)\\ \hat{g}_i^-(\tau)\end{pmatrix}, \Delta\Sigma_{E,i}\right)$. Using the N-firm EA identities (with $q_{\theta g_i}^-(\tau)=0$ in the interior), the event-time variance drop is

$$\Delta\Sigma_{E,i} \equiv \begin{bmatrix}\Delta q_{\theta\theta}(\tau) & \Delta q_{\theta g_i}(\tau)\\ \Delta q_{\theta g_i}(\tau) & \Delta q_{ii}(\tau)\end{bmatrix} = \begin{bmatrix}q_{\theta\theta}^-(\tau)-q_{\theta\theta}^+(\tau) & \alpha_i(\tau)q_{\theta\theta}^+(\tau)\\ \alpha_i(\tau)q_{\theta\theta}^+(\tau) & \alpha_i(\tau)q_{ii}^-(\tau)-\alpha_i^2(\tau)q_{\theta\theta}^+(\tau)\end{bmatrix}.$$

Or equivalently,

$$\Delta q_{\theta\theta}(\tau) = q^-_{\theta\theta}(\tau) - q^+_{\theta\theta}(\tau) = \frac{\left(q^-_{\theta\theta}(\tau)\right)^2 \bar{s}_\Sigma}{1 + q^-_{\theta\theta}(\tau)\bar{s}_\Sigma},$$

$$\Delta q_{\theta g_i}(\tau) = q^-_{\theta g_i}(\tau) - q^+_{\theta g_i}(\tau) = 0 - \left(-\alpha_i(\tau) q^+_{\theta\theta}(\tau)\right) = \alpha_i(\tau) q^+_{\theta\theta}(\tau) = \frac{q^-_{\theta\theta}(\tau) q^-_{ii}(\tau)}{\left(1 + q^-_{\theta\theta}(\tau)\bar{s}_\Sigma\right)} v_i,$$

$$\begin{aligned}\Delta q_{ii}(\tau) &= q^-_{ii}(\tau) - q^+_{ii}(\tau) = q^-_{ii}(\tau) - \left(q^-_{ii}(\tau)(1-\alpha_i(\tau)) + \alpha_i^2(\tau) q^+_{\theta\theta}(\tau)\right) = \alpha_i(\tau) q^-_{ii}(\tau) - \alpha_i^2(\tau) q^+_{\theta\theta}(\tau) \\ &= \left(q^-_{ii}(\tau)\right)^2 \left(v_i - v_i^2 q^+_{\theta\theta}(\tau)\right) = \left(q^-_{ii}(\tau)\right)^2 v_i \left[1 - \frac{v_i q^-_{\theta\theta}(\tau)}{1 + q^-_{\theta\theta}(\tau)\bar{s}_\Sigma}\right].\end{aligned}$$

Rank / singularity issue:

- If only firm i announces (the one-firm case), then $\bar{s}_\Sigma = v_i$ and $\Delta\Sigma_{E,i}$ is rank-1 (singular).
- If two or more firms announce ($N \geq 2$), then $\bar{s}_\Sigma > v_i$ and $\Delta\Sigma_{E,i}$ is full rank (positive definite). So the EA kernel is a proper two-dimensional Gaussian for the focal pair.

We compute the boundary condition in two steps. First, condition on a realization of $\sigma_{E,i}(\tau)$. This intermediate step is:

$$\begin{aligned}p\left(\sigma_{E,i}(\tau); \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, \tau^-; q_0\right) &= \mathbb{E}\left[\left.\frac{H\left(\hat{\theta}^+_\tau, \tau^+\right)^B p\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}, \tau^+; q_0\right)}{\left(\mathbb{E}\left[H\left(\hat{\theta}^+_\tau, \tau^+\right) \mid \hat{\theta}^-_\tau, \tau^-\right]\right)^B} \right| \sigma_{E,i}(\tau), \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, \tau^-; q_0\right] \\ &= \frac{\iint H\left(\hat{\theta}^+_\tau, \tau^+\right)^B p\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}, \tau^+; q_0\right) \phi\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau} \middle| \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, \Delta\Sigma_{E,i}\right) d\hat{\theta}^+_\tau d\hat{g}^+_{i,\tau}}{\left[\int_{-\infty}^{+\infty} H\left(\hat{\theta}^+_\tau, \tau^+\right) \phi_1\left(\hat{\theta}^+_\tau \middle| \hat{\theta}^-_\tau, \Delta q_{\theta\theta}(\tau)\right) d\hat{\theta}^+_\tau\right]^B} \\ &= \frac{\iint e^{B \ln H\left(\hat{\theta}^+_\tau, \tau^+\right) + \ln p\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}, \tau^+; q_0\right)} \phi\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau} \middle| \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, \Delta\Sigma_{E,i}\right) d\hat{\theta}^+_\tau d\hat{g}^+_{i,\tau}}{\left[\int e^{\ln H\left(\hat{\theta}^+_\tau, \tau^+\right)} \phi_1\left(\hat{\theta}^+_\tau \middle| \hat{\theta}^-_\tau, \Delta q_{\theta\theta}(\tau)\right) d\hat{\theta}^+_\tau\right]^B}\end{aligned}$$

Second, average over the heterogeneity in $\sigma_{E,i}(\tau)$:

$$\begin{aligned}p\left(\hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, \tau^-; q_0\right) &= \mathbb{E}\left[\left. p\left(\sigma_{E,i}(\tau); \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, \tau^-; q_0\right) \right| \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, \tau^-; q_0\right] \\ &= \sum_{n=1}^{N} prob_n p\left(\sigma_{E,n}; \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, \tau^-; q_0\right).\end{aligned}$$

C.3 Stationary Approximation for the History Dependence of $\bar{s}_\Sigma$

At an earnings announcement time τ with N announcing firms, the aggregate EA precision entering the updating of aggregate beliefs is

$$\bar{s}_\Sigma(\tau) = \sum_{i=1}^{N} v_i(\tau), \qquad v_i(\tau) = \frac{1}{q_{ii}^-(\tau) + \sigma_{E,i}^2(\tau)}.$$

Because each firm's pre-EA idiosyncratic variance $q_{ii}^-(\tau)$ depends on its own history of past EA precision realizations, the realized value of $\bar{s}_\Sigma(\tau)$ is cohort- and history-specific. Substituting this realized $\bar{s}_\Sigma$ directly into the EA boundary condition for the value function H would therefore make H depend on the entire cross-sectional vector $\{q_{ii}^-(\tau)\}_{i=1}^N$. This would substantially enlarge the state space and break the simplification that H depends only on the aggregate belief $\hat{\theta}$.

To preserve tractability, we use a stationary type-mean approximation to construct a permutation-invariant cohort aggregator. We retain full cross-sectional heterogeneity in the firm-level problem (for the price-to-dividend ratio p), but restrict the boundary condition for H to depend only on a deterministic aggregator $\bar{s}_\Sigma$ that does not carry firm-level histories.

Here is the setup. Time is organized into announcement cycles. In each cycle: (i) out of the $2N$ firms, N announce earnings each cycle and the other N are non-announcers, modeled as the limiting uninformative-signal type; (ii) the announcing cohort uses the N values $\{\sigma_{E,1}, \ldots, \sigma_{E,N}\}$ drawn from F_E, with each element assigned once to firms by random permutation, independently across cycles; (iii) a macro announcement immediately follows and is fully revealing; (iv) the interior span from T^+ to the next τ has fixed length Δ; that is, $\Delta = \tau - T^+$. Between T^+ and the next τ^-, each firm's idiosyncratic variance q_{ii} evolves deterministically according to the Riccati equation. Let $\Phi_\Delta(x)$ denote the deterministic mapping that takes the post-macro idiosyncratic variance at T^+ ($q_{ii}^+(T)$) to the pre-EA variance at the next τ^- ($q_{ii}^-(\tau)$) over the fixed interior length Δ, so that:

$$q_{ii}^+(T) = x \quad \Longrightarrow \quad q_{ii,\text{next}}^-(\tau) = \Phi_\Delta(x). \tag{C.13}$$

In the same cycle, for a given pre-EA variance $q_{ii}^-(\tau)$ and an EA noise variance σ_E^2, the post-

macroeconomic-announcement idiosyncratic variance at T^+ is given by (from Equation (A.15)):

$$q_{ii}^{+}(T;\sigma_{E,n}) = \frac{q_{ii}^{-}(\tau)\sigma_{E,n}^2}{q_{ii}^{-}(\tau) + \sigma_{E,n}^2}.$$

We now define the type-conditional *means*. At the start of any cycle (just before EAs at τ), firms are grouped according to the EA precision they received in the previous cycle. We refer to this classification as the firm's "previous type." Previous types partition the announcing cohort: there are N such types, each comprising a fraction $1/N$ of the recent announcers. A non-announcer's idiosyncratic variance is not reduced at any earnings announcement; it converges to the steady state of the Riccati equation and plays no role in the aggregator below. Let μ_m denote the (type-conditional) mean pre-EA idiosyncratic variance q_{ii}^{-} in the current cycle for firms whose "previous type" was m (i.e., firms that received $\sigma_{E,m}$ in the previous cycle). Importantly, we are not saying each firm repeats its own q. We are only tracking type-conditional group means $(\mu_1, ..., \mu_N)$ across cycles.

Under independent permutations, EA precision assignments are independent across cycles; the set of firms classified as "previous type m" in the next cycle contains an equal fraction $1/N$ from each current previous-type group (within the announcing cohort). As a result, at stationarity the vector of type-conditional means $\mu = (\mu_1, \ldots, \mu_N)$ satisfies the vector fixed-point system

$$\mu_m^{k+1} = \frac{1}{N}\sum_{l=1}^{N} \Phi_\Delta\left(\frac{\mu_l^k \sigma_{E,m}^2}{\mu_l^k + \sigma_{E,m}^2}\right), \qquad m = 1, \ldots, N. \tag{C.14}$$

For a given calibration, this system can be solved once by fixed-point iteration, starting from any admissible initial condition (e.g., the steady-state solution of the Riccati equation).

Finally, we construct the permutation-invariant cohort aggregator. Given the stationary solution $\{\mu_n\}_{n=1}^N$, we define the permutation-invariant cohort aggregator

$$\bar{s}_\Sigma = \sum_{n=1}^{N}\frac{1}{N}\sum_{m=1}^{N}\frac{1}{\mu_n + \sigma_{E,m}^2}. \tag{C.15}$$

Both sums run over the N announcing types; the non-announcers do not contribute to $\bar{s}_\Sigma$, since

$v_i \to 0$ as $\sigma^2_{E,i}(\tau) \to \infty$. This $\bar{s}_\Sigma$ is deterministic (given parameters) and does not reflect firm-level histories. We therefore use $\bar{s}_\Sigma$ in the EA boundary condition for the aggregate posterior variance,

$$q^+_{\theta\theta}(\tau) = \frac{q^-_{\theta\theta}(\tau)}{1 + q^-_{\theta\theta}(\tau)\,\bar{s}_\Sigma}, \qquad q^-_{\theta\theta}(\tau) - q^+_{\theta\theta}(\tau) = \frac{\big(q^-_{\theta\theta}(\tau)\big)^2 \bar{s}_\Sigma}{1 + q^-_{\theta\theta}(\tau)\,\bar{s}_\Sigma}.$$

With this construction, the value function H remains common across firms and depends only on the aggregate belief $\hat{\theta}$.

To illustrate the mechanism and intuition, consider an example with $N = 2$. Suppose there are two EA noise variances $\{\sigma^2_{E,1}, \sigma^2_{E,2}\}$ in each cycle. Denote $g\,(q, \sigma) = \frac{q\sigma^2}{q+\sigma^2}$, which is essentially the post-EA idiosyncratic variance $q^+_{ii}(T)$.

Let μ_1^{k-1} and μ_2^{k-1} denote the previous-type pre-EA means in cycle $k-1$. Firms that receive $\sigma_{E,1}$ in that cycle finish the earnings announcement with $g(\mu_1^{k-1}, \sigma_{E,1})$, which then evolves deterministically to $\Phi_\Delta(g(\mu_1^{k-1}, \sigma_{E,1}))$ by the next pre-EA date. The same logic applies to type 2 (firms that receive $\sigma_{E,2}$): $\Phi_\Delta\big(g(\mu_2^{k-1}, \sigma_{E,2})\big)$.

At the start of cycle k, we regroup firms by the EA noise they used in cycle $k-1$. So the pre-EA mean of "previous type 1" in cycle k should be

$$\mu_1^k = \Phi_\Delta\big(g(\mu_1^{k-1}, \sigma_{E,1})\big), \qquad \mu_2^k = \Phi_\Delta\big(g(\mu_2^{k-1}, \sigma_{E,2})\big).$$

That would be true if the same firms stayed in those labels. But they don't: in cycle k the assignment of current EA noises is a fresh permutation, independent of cycle $k-1$.

Because assignments are independent across cycles, the set of firms that end up as "previous type 1" in cycle $k+1$ is a mix of all groups from cycle k. Each of the two groups from cycle k contributes half the mass (under random permutation). Hence, for cycle $k+1$,

$$\mu_1^{k+1} = \tfrac{1}{2}\left[\Phi_\Delta\big(g(\mu_1^k, \sigma_{E,1})\big) + \Phi_\Delta\big(g(\mu_2^k, \sigma_{E,1})\big)\right],$$

and similarly

$$\mu_2^{k+1} = \tfrac{1}{2}\left[\Phi_\Delta\big(g(\mu_1^k, \sigma_{E,2})\big) + \Phi_\Delta\big(g(\mu_2^k, \sigma_{E,2})\big)\right].$$

At stationarity, where $\mu^k = \mu^{k+1} = \mu$, the type-conditional means satisfy the vector fixed-point condition

$$\mu_m = \frac{1}{N} \sum_{l=1}^{N} \Phi_{\Delta}\big(g(\mu_l, \sigma_{E,m})\big), \qquad m = 1, \ldots, N.$$

which in this example reduces to an average across the two types. Although individual firms continue to follow heterogeneous and history-dependent variance paths, the mapping from the previous-type label to the current *mean* pre-EA variance is time-invariant. This fixed point therefore delivers a well-defined, permutation-invariant cohort aggregator $\bar{s}_{\Sigma}$.