Macroeconomic Announcements and the Repricing of Earnings Risk

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Abstract: Macroeconomic announcements lead to the repricing of previous firm-specific earnings news, generating cross-sectional heterogeneity in risk compensation. When firms announce earnings, investors form joint beliefs about firm-specific and aggregate conditions. Subsequent macroeconomic announcements reveal information about the aggregate state of the economy, prompting investors to reassess the firm-specific component of prior earnings news. We develop a dynamic general equilibrium model in which investors rationally learn from both earnings and macroeconomic announcements to quantify this repricing channel. Empirical evidence supports the model's predictions: on macroeconomic announcement days, firms with recent earnings news earn a lower risk premium relative to those without, and this effect is stronger for firms whose earnings announcements were more informative about aggregate conditions.

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

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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 expected cash flows for all firms, while unfavorable news lowers them (Savor and Wilson (2014, 2016)). 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 firm-specific earnings news. We show that this mechanism is quantitatively important and generates substantial cross-sectional heterogeneity in announcement-day returns.

Firm earnings announcements convey information about both future expected macroeconomic conditions and firm-specific fundamentals. When subsequent macroeconomic announcements reveal the aggregate state of the economy, rational investors update not only their beliefs about the macroeconomy but also their beliefs about firm-specific fundamentals. Consequently, a rational capital market must reprice prior firm-specific earnings news on macroeconomic announcement days. If macro data reveal that aggregate conditions were stronger than previously believed, investors infer that a positive earlier earnings surprise reflected favorable macro conditions rather than idiosyncratic outperformance and therefore revise their expectations about firm-specific cash flows downward. Conversely, worse-than-expected macroeconomic news leads to upward revisions of the firm-specific component. This repricing channel implies a negative covariance between aggregate and firm-specific belief updates, which dampens the firm's return comovement with the market and thereby lowers its beta and risk premium on macroeconomic announcement days.

We demonstrate this repricing mechanism in a dynamic general equilibrium model of learning from both earnings and macroeconomic announcements. Both expected firm-specific cash flow growth (g) and aggregate cash flow growth (θ) are unobservable, requiring investors to form Bayesian beliefs based on public information. We assume a cross section of firms announces earnings simultaneously at pre-scheduled dates. Each firm's earnings announcement is a noisy signal about the sum of firm-specific and aggregate cash flow growth, $g + \theta$. Investors therefore use earnings announcements to jointly update their beliefs about firm fundamentals and aggregate economic conditions.

Immediately after the earnings announcement, a scheduled macroeconomic announcement fully reveals aggregate cash flow θ, allowing investors to disentangle these components and reprice the information content of prior earnings announcements. Because the earlier earnings announcement conveyed information about the sum $g + \theta$, a positive surprise in θ mechanically triggers a negative revision in firm-specific g, and vice versa. Consequently, the firm's return (driven by beliefs about both θ and g) comoves negatively with the market return (driven solely by θ) on macroeconomic announcement days. This negative comovement lowers the firm's beta and required risk compensation. We refer to this negative contribution to expected returns as the *repricing premium*. By offsetting standard macroeconomic risk exposure, firms that announce earnings shortly before macroeconomic news effectively act as partial hedges against aggregate shocks.

Our model further predicts cross-sectional heterogeneity in this repricing effect. Firms with more informative earnings announcements about macroeconomic conditions exhibit higher earnings-announcement-day 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-day betas because precise signals induce joint revisions in firm-specific and aggregate 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 near one-for-one opposite revision in g, generating a more negative covariance and a larger repricing premium. In contrast, when earnings 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 macro announcement returns.

We empirically test the economic mechanism of the repricing channel by examining four predictions 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. This return spread captures the repricing premium, as the repricing mechanism dampens the returns of recent announcers but is absent for non-announcers. Empirically, we classify firms into "announcers" (those that reported earnings within the prior 15 trading days) and "non-announcers" (those without recent earnings news), and compare their average returns on macro announcement days. Consistent with the theory, announcers systematically underperform non-announcers when macro news is released. Because each firm's return on a macro announcement day reflects both its unconditional CAPM beta and the additional exposure

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

induced by repricing, we construct CAPM-neutral returns that remove the unconditional CAPM component to isolate the repricing channel. A long-short portfolio that is long non-announcers and short announcers, matched on size and industry, earns approximately 6 to 7 basis points (bps) in daily CAPM-neutral returns per macro announcement day.

The second prediction of our model concerns cross-sectional heterogeneity among announcers. Firms whose earnings announcements are more informative about macroeconomic conditions should exhibit higher earnings announcement betas but lower macro announcement betas and returns. To test this implication, we extend the approach of Patton and Verardo (2012) and estimate market betas using high-frequency intraday returns. We measure earnings announcement informativeness 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 prior to each macroeconomic announcement, we sort announcers into portfolios based on their earnings announcement informativeness. Consistent with the model, we find a steep monotonic pattern: firms in the highest earnings-day excess beta quintile (most informative) earn substantially lower average returns on the subsequent macro announcement day than firms in the lowest quintile, and their macro-day 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 macro 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 event ("recent announcers") earn substantially lower returns on macro announcement days than firms that announce immediately after ("distant announcers", as they are farthest from the next macroeconomic announcement). In the model, firms announcing earnings after a macro announcement face no repricing because the aggregate state is already known at the time of the earnings release. In contrast, firms announcing earnings just before a macro announcement are subject to repricing and therefore earn significantly lower macro-announcement-day returns. Consistent with this prediction, portfolios that are long distant announcers and short recent announcers generate economically and statistically significant returns of 15 bps per event.

Finally, we provide direct evidence on the belief-revision channel using analyst EPS forecast revisions around macroeconomic announcement days. The 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, since macroeconomic news can also move 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, consistent with the model, recent announcers' forecast revisions respond negatively to macroeconomic surprises relative to the benchmark firms. We also show that analyst forecasting activity increases on macroeconomic announcement days, especially for firms with recent earnings news. This pattern cannot be explained by earnings-announcement timing or post-earnings-announcement information dynamics.

Our model quantitatively accounts for the repricing channel. Calibrated to match standard macroeconomic and asset-pricing moments, it reproduces average earnings announcement and macro announcement premia comparable to those observed in the data. Crucially, it replicates the key cross-sectional patterns we document: the systematic underperformance of recent announcers relative to non-announcers and the monotonic relation between earnings informativeness and the subsequent repricing premium.

Related Literature Our paper contributes to the literature on how macroeconomic news affects stock returns. A large body of work documents significant excess returns around macroeconomic—especially FOMC—announcement 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), while 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 macro announcement days: unconditional market beta strongly predicts the cross section of returns, implying that individual stocks comove positively with the market. 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 in which individual stock and market returns comove negatively on announcement days, opposite to the positive comovement in Savor and Wilson (2014). Our paper highlights the importance of high-frequency micro data for understanding the impact of macroeconomic policy announcements. Other work explores stock-level exposure to monetary policy surprises and documents cross-sectional FOMC announcement premiums: Ai, Han, Pan, and Xu (2022) use option-implied variance, Ozdagli (2018) and Chava and Hsu (2020) examine financial constraints, and Ozdagli and Velikov (2020) construct an exposure index. 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 (2025), among others), but these studies do not provide a risk-based explanation. Savor and Wilson (2016) offer such a mechanism by showing that scheduled earnings announcements contain both firm-specific and aggregate cash flow information, creating a signal-extraction problem: investors observe total earnings but must infer the aggregate component. This spillover 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 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 macro announcement days, when macro news reveals purely aggregate cash flow information. This induces investors to reprice earlier firm-specific earnings news. Unlike the earnings-focused literature, we emphasize that earnings and macro announcements contain distinct information, prompting investors to learn across announcements and generating cross-sectional variations in returns on macro announcement days.

Third, our paper broadly fits within the literature on learning and information spillovers. 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 (2025) demonstrate that investors extract more

[2]Related literature documents attention spikes on announcement days, consistent with our theory that

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 theoretically frames the cross-learning mechanism in clustered earnings announcements, showing that investors pool signals to extract aggregate cash-flow information, and we focus on the implications of this learning for risk premia on macro-announcement days.

The rest of the paper is organized as follows. Section 2 shows motivating empirical evidence that firms that recently announced their earnings earn lower returns on macro announcement days compared to other firms. Section 3 develops a dynamic general equilibrium model featuring both earnings and macroeconomic announcements and establishes the theoretical link between earnings informativeness and the repricing premium. Section 4 tests these 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 on the previous trading day into two groups. Announcers are firms that released a scheduled earnings announcement within the prior 15 days, while non-announcers are firms with no recent earnings news. To ensure comparability, we construct the non-announcer portfolio to match the industry, size, and unconditional CAPM beta decile composition of the announcer portfolio. We also exclude firms that announce earnings on the macroeconomic announcement day itself and require at least 100 announcing firms per event to ensure reliable portfolio formation.

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 announcers on these days. The equal-weighted long-short spread—long non-announcers, short announcers—is 8.0 basis points

investors extract signals from announcements (e.g., Drake, Roulstone, and Thornock (2012), Hirshleifer and Sheng (2021), Fisher, Martineau, and Sheng (2022)).

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

	Data (EW)	Data (VW)
Non-Announcers (Long)	27.0	27.0
	(3.92)	(4.29)
Announcers (Short)	20.0	19.0
	(2.90)	(3.36)
Long-short	**8.0**	**8.0**
	(3.61)	**(2.34)**

This table reports daily excess returns (in basis points) for portfolios formed on macroeconomic announcement days. The short portfolio (Announcers) consists of firms that issued a scheduled earnings announcement within the prior 15 trading days. The long portfolio (Non-Announcers) consists of firms without recent earnings announcements, matched to announcers by size, industry, and unconditional CAPM beta decile. Equal-weighted (EW) and value-weighted (VW) returns are computed for each announcement day. The table reports time-series means with t-statistics in parentheses. The sample includes 429 macroeconomic announcement days over 1994–2024.

($t = 3.61$), and the value-weighted spread is 8.0 basis points ($t = 2.34$), both statistically significant (approximately 1.2% annualized). This pattern suggests that macroeconomic announcements systematically reprice earlier earnings news, dampening the returns of recent announcers relative to other firms.

3 A Dynamic Model

In this section, we present a dynamic general equilibrium model of learning across earnings and macroeconomic announcements to formalize the macroeconomic announcement repricing channel. The model provides a quantitative 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 $\gamma > 1 > 1/\psi$, such 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* aggregate cash flow (expected long-run consumption growth) 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.

There is a cross-section of $2N$ firms. Half of the firms are permanent announcers that release an earnings announcement in every cycle ("announcers"), and the other half release announcements that contain no information ("non-announcers"). 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 cash flow growth rate and σ_D the idiosyncratic volatility of the dividend-consumption ratio. The common component $\sigma_u dB_{u,t}$ is an 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.

Earnings and Macroeconomic Announcements Both the aggregate and the firm-specific cash flow components, θ_t and $g_{i,t}$, are unobservable. Investors continuously learn about these latent states from two sources. First, the observed aggregate consumption C_t

and the firm's dividends $D_{i,t}$ contain information. 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 about both aggregate and firm-specific cash flow components. 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 market-wide news (θ) and firm-specific news (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. To capture cross-sectional heterogeneity in earnings announcement informativeness, we assume that N firms announce simultaneously and that $\sigma_{E,i}(\tau)$ is drawn from a common distribution F_E, which is log-uniformly distributed 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, the limiting type $\sigma^2_{E,i} \to \infty$.

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_t:[4]

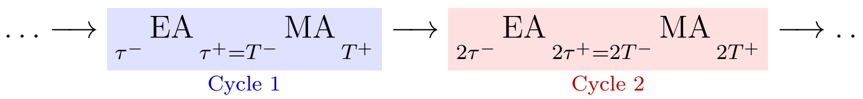
$$s_M(T) = \theta_T. \tag{7}$$

For notational convenience, we focus on a representative announcement cycle $[0, T]$. Let T (or T^-) denote the instant just before the macro announcement and T^+ (or 0) the instant immediately afterward. Likewise, let τ (or τ^-) be the moment just before the earnings announcement and τ^+ the moment just after it. We consider the representative case in which

[3] On each earnings date, N values are drawn from $F_E = \{\sigma^2_{E,1}, \ldots, \sigma^2_{E,N}\}$ 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 $\sigma^2_{E,i}(\tau)$ across cycles is independent over time. 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 announcements would not affect the repricing mechanism but would substantially increase the state space by introducing additional cross-sectional covariances. We therefore abstract from this without loss of generality.

the earnings announcement occurs immediately prior to the macroeconomic announcement, so that $\tau \to T$ and $\tau^+ = T^-$. In other words, the instant after the earnings announcement coincides with the instant before the macro announcement.[5] This timeline allows us to isolate the repricing mechanism: investors first form joint beliefs at the earnings announcement, which are subsequently disentangled at the macroeconomic announcement. The timeline is summarized as follows:



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 flows, 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 cash flow and $q_{ii}(t) \equiv \mathbb{E}[(\hat{g}_{i,t} - g_{i,t})^2]$ for firm i's idiosyncratic cash flow. We further define the covariance between aggregate and firm-specific cash flows 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 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 1 of Appendix A.1. Note that the covariances satisfy $q_{\theta g_i}(t) = 0$ and $q_{ij}(t) = 0$. This independence arises because the preceding macroeconomic announcement fully revealed the aggregate state θ, resetting cross-component uncertainty to zero. Consequently, in the interior of the cycle, investors learn about the aggregate and firm-specific components separately.

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

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

This index measures the weight investors place on the earnings signal relative to prior uncertainty. A more precise earnings announcement (lower $\sigma_{E,i}^2$) increases α_i: as the signal becomes perfectly informative, $\alpha_i \to 1$, whereas $\alpha_i \to 0$ when the signal is highly noisy.

[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.

We now summarize how beliefs update at the earnings and macro announcements. The posterior moments and their full derivations are provided in Lemma 2 in 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:

$$\hat{\theta}^{+}(\tau) = \hat{\theta}^{-}(\tau) + q^{+}_{\theta\theta}(\tau) \times (\text{Pooled Surprise}), \tag{9}$$

$$\hat{g}^{+}_{i}(\tau) = \hat{g}^{-}_{i}(\tau) + \alpha_i z_i - \alpha_i \left(\hat{\theta}^{+}(\tau) - \hat{\theta}^{-}(\tau)\right), \tag{10}$$

where $q^{+}_{\theta\theta}(\tau) = \frac{q^{-}_{\theta\theta}(\tau)}{1+q^{-}_{\theta\theta}(\tau)s_{\Sigma}}$ is the updated aggregate variance, $s_{\Sigma} \equiv \sum_{i=1}^{N} v_i$, and $v_i \equiv [\, q^{-}_{ii}(\tau) + \sigma^{2}_{E,i}(\tau)\,]^{-1}$.[6] The pooled surprise is defined as $\sum_{i=1}^{N} v_i z_i$, and the firm-specific earnings surprise is $z_i \equiv s_{E,i}(\tau) - (\hat{\theta}^{-}_{\tau} + \hat{g}^{-}_{i,\tau})$.

The first equation shows that investors learn about the aggregate component by pooling earnings surprises across firms, placing greater weight on more informative announcements. The second equation decomposes the firm-level belief revision into a purely idiosyncratic component, $\alpha_i z_i$, and an offsetting adjustment that removes the portion attributed to the market-wide news. As a result, firm-specific beliefs reflect only the residual component of the earnings surprise after accounting for common information.

This joint updating generates two effects. First, pooling information reduces uncertainty about the aggregate component, so $q^{+}_{\theta\theta}(\tau) < q^{-}_{\theta\theta}(\tau)$. Second, because the earnings signal mixes aggregate and firm-specific news, belief updating induces a negative conditional covariance,

$$q^{+}_{\theta g_i}(\tau) = -\alpha_i q^{+}_{\theta\theta}(\tau) < 0. \tag{11}$$

Intuitively, the earnings signal pins down the sum $\theta + g_i$, so an upward revision in θ requires a downward revision in g_i. Consequently, after the earnings announcement, each firm's idiosyncratic component becomes negatively correlated with the common component.

Updates at the Macroeconomic Announcement T: At time T, the macroeconomic announcement fully reveals the true aggregate state θ_T, resolving all common uncertainty so that $q^{+}_{\theta\theta}(T) = 0$. This revelation forces a revision of the beliefs formed at the earnings announcement and drives the repricing of firm-specific fundamentals. The repricing

[6] In general, s_{Σ} 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 a proof).

mechanism is summarized in the following proposition.

Proposition 1. *(Repricing Channel and Cross-Sectional Risk). After the earnings announcement at τ, the conditional common-idiosyncratic covariance becomes negative, i.e., $q^{+}_{\theta g_i}(\tau) = -\alpha_i q^{+}_{\theta\theta}(\tau) < 0$.*

At the subsequent macroeconomic announcement T, the aggregate state is fully revealed, i.e., $\hat{\theta}^{+}(T) = \theta_T$. The firm-specific belief updates according to:

$$\hat{g}_i^{+}(T) - \hat{g}_i^{+}(\tau) = -\alpha_i \left(\theta_T - \hat{\theta}^{+}(\tau)\right), \tag{12}$$

and the covariance of conditional expectations satisfies:

$$\mathrm{Cov}\left(\hat{\theta}^{+}_{T}, \hat{g}^{+}_{i,T}\right) = -\alpha_i q^{+}_{\theta\theta}(\tau) < 0. \tag{13}$$

Holding other objects fixed, the comparative statics with respect to firm i's earnings announcement noise satisfy

$$\frac{d\mathrm{Cov}\left(\hat{\theta}^{+}_{\tau}, \hat{g}^{+}_{i,\tau}\right)}{d\sigma^2_{E,i}} < 0, \qquad \frac{d\mathrm{Cov}\left(\hat{\theta}^{+}_{T}, \hat{g}^{+}_{i,T}\right)}{d\sigma^2_{E,i}} > 0. \tag{14}$$

Proof. See Appendix A.1. □

The proposition formalizes the *repricing channel*. Because the sum $\theta + g_i$ was pinned down by the earnings signal at τ, any surprise in the aggregate component θ at time T forces an opposite revision in the firm-specific component g_i. Equation (12) shows that when macroeconomic conditions are stronger than expected ($\theta_T > \hat{\theta}^{+}_{\tau}$), investors realize that part of the earlier earnings strength was over-attributed to firm-specific fundamentals, leading to a downward revision in $\hat{g}_i$; conversely, weaker-than-expected macroeconomic conditions induce an upward revision.

The magnitude of this repricing is governed by the informativeness index α_i. Firms with more informative earnings announcements (lower $\sigma^2_{E,i}$, higher α_i) experience stronger repricing because the earnings signal tightly identifies the sum of aggregate and firm-specific growth, $\theta + g_i$; thus, revisions to θ translate almost one-for-one into opposite revisions to g_i. When earnings announcements are less informative, the attribution between aggregate and firm-specific components is weaker and the induced covariance is closer to zero.

The macroeconomic announcement concludes this signal-extraction process by fully revealing the aggregate state. As aggregate uncertainty vanishes ($q^{+}_{\theta\theta}(T) = 0$), the covariance between aggregate and firm-specific beliefs collapses to zero ($q^+_{\theta g_i} = 0$), leaving only idiosyncratic uncertainty to drive returns until the next cycle.

Implications for Announcement Betas: Since announcement betas are proportional to the covariances of conditional expectations, Proposition 1 maps directly into announcement betas and premia. To formally compute the CAPM beta, we define the market return as the equal-weighted average of returns from all firms (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) Conditioning on $\sigma_{E,i}$, the earnings announcement beta is:*

$$\beta_{E,i}|\sigma_{E,i} = \frac{\mathrm{Cov}\left(R_{E,i}, R_{E,M}|\,\sigma_{E,i}\right)}{\mathrm{Var}\left(R_{E,M}|\,\sigma_{E,i}\right)}, \tag{15}$$

where the earnings announcement return for firm i is $R_{E,i} \equiv \frac{p(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}, q^+_{ii,\tau}, \tau^+)}{\tilde{p}(\sigma_{E,i}; \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, q^-_{ii,\tau}, \tau^-)}$, 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

$$\beta_{M,i}|\sigma_{E,i} = \frac{\mathrm{Cov}\big(\, R_{M,i}, R_{M,M}|\,\sigma_{E,i}\big)}{\mathrm{Var}\big(\, R_{M,M}|\,\sigma_{E,i}\big)}, \tag{16}$$

where $R_{M,i} \equiv \frac{p(\hat{\theta}^+_T, \hat{g}^+_{i,T}, q^+_{ii,T}, T^+)}{p(\hat{\theta}^-_T, \hat{g}^-_{i,T}, q^-_{ii,T}, T^-)}$, and $R_{M,M} \equiv \frac{1}{2N}\sum_{j=1}^{2N} R_{M,j}$.

Firm returns depend on both aggregate and firm-specific beliefs $(\hat{\theta}, \hat{g}_i)$, whereas the market return, as the average of many firms, is dominated by the aggregate component $(\hat{\theta})$. With the (log) price-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 common-idiosyncratic covariance $\mathrm{Cov}(\hat{\theta}, \hat{g}_i)$. Thus, the beta inherits the properties of the covariance dynamics derived in Proposition 1.

At the macroeconomic announcement, the negative covariance $\mathrm{Cov}(\hat{\theta}^+_T, \hat{g}^+_{i,T}) < 0$ implies a lower announcement-day beta and a lower macro announcement premium relative to firms where this repricing channel is absent. Moreover, Equation (14) shows that because $\mathrm{Cov}(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau})$ decreases in $\sigma^2_{E,i}$ while $\mathrm{Cov}(\hat{\theta}^+_T, \hat{g}^+_{i,T})$ increases in $\sigma^2_{E,i}$, firms with more informative earnings announcements exhibit larger earnings announcement betas but significantly lower macro announcement betas.

3.2 Asset Prices

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

$$\frac{dD_{i,t}}{D_{i,t}} = \left(\hat{g}_{i,t} + \hat{\theta}_t\right) dt + \sigma_C d\hat{B}_{C,t} + \sigma_u dB_{u,t} + \sigma_D d\hat{B}_{D_i,t}, \tag{17}$$

which follows immediately from Equation (3).

Under recursive preferences, the representative agent's lifetime utility can be written as: $V\left(\hat{\theta}_t, t, C_t\right) = \frac{1}{1-\gamma} H\left(\hat{\theta}_t, t\right) C_t^{1-\gamma}$. As a result, changes in beliefs about θ_t are reflected through the continuation utility $H\left(\hat{\theta}_t, t\right)$. Note that only beliefs about the aggregate cash flow affect the continuation utility and the stochastic discount factor (SDF); the value function does not depend on firm-specific growth $g_{i,t}$ because idiosyncratic shocks do not affect aggregate consumption. Solutions for the value function are provided in Lemma 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

$$\frac{dM\left(\hat{\theta}_t, t\right)}{M\left(\hat{\theta}_t, t\right)} = -r\left(\hat{\theta}_t, t\right) dt - \sigma_M\left(\hat{\theta}_t, t\right) d\hat{B}_{C,t}, \tag{18}$$

where the risk-free rate $r(\hat{\theta}_t, t)$ and the market price of risk $\sigma_M\left(\hat{\theta}_t, t\right)$ are given in Equations (A.43) and (A.44) 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-covariances matrix of beliefs (i.e., $\{q_{\theta\theta}, q_{ii}, q_{\theta g_i}, q_{ij}\}_{i=1,...N}$ 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 variable, $\sigma^2_{E,i}(\tau)$, entering only through boundary conditions at announcement dates.[7] We denote the price-to-dividend ratio by $p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right)$, so that

[7]Specifically, the posterior variance of aggregate cash flow, $q_{\theta\theta}$, is deterministic over time (see Equation

the stock price is given by $p(\cdot)D_{i,t}$. By definition, the stock price equals the discounted expected future dividends:

$$p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) D_{i,t} = \mathbb{E}\left[\int_0^\infty \frac{M_{t+s}}{M_t} D_{i,t+s} ds \mid \hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right]. \tag{19}$$

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

In the interior $(0, \tau)$, the instantaneous risk premium is

$$\mathbb{E}_t\left[\frac{d\left[p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) D_{i,t}\right] + D_{i,t}dt}{p\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) D_{i,t}}\right] - r\left(\hat{\theta}_t, t\right) dt = \left(\gamma\sigma_C - \frac{\frac{1}{\psi} - \gamma}{\sigma_C(1-\gamma)} \frac{H_\theta}{H} q_{\theta\theta,t}\right)\left(\sigma_C + \frac{p_\theta}{p}\frac{q_{\theta\theta,t}}{\sigma_C}\right), \tag{20}$$

where subscripts for H and p denote partial derivatives.

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) Let* $B \equiv \frac{\frac{1}{\psi} - \gamma}{1-\gamma}$*. At the earnings announcement* τ*, the earnings announcement premium conditional on* $\sigma_{E,i}$ *is*

$$R_{E,i}(\sigma_{E,i}; \tau) = \frac{\mathbb{E}_{\tau^-}\left[p\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}, q^+_{ii,\tau}, \tau^+\right) \middle| \sigma_{E,i}\right]}{\tilde{p}\left(\sigma_{E,i}; \hat{\theta}^-_\tau, \hat{g}^-_{i,\tau}, q^-_{ii,\tau}, \tau^-\right)}, \tag{21}$$

where the conditional price-to-dividend ratio is

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

(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 2 in Appendix A.1).

At the macro announcement T, the macro announcement premium conditional on $\sigma_{E,i}$ is

$$R_{M,i}(\sigma_{E,i};T) = \frac{\mathbb{E}_{T^-}\left[p\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+, q_{ii,T}^+, T^+\right)\Big|\, \sigma_{E,i}\right]}{\tilde{p}\left(\sigma_{E,i}; \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right)}, \tag{22}$$

where the conditional price-to-dividend ratio is defined as:

$$\tilde{p}\left(\sigma_{E,i}; \hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right) = \frac{\mathbb{E}_{T^-}\left[H\left(\hat{\theta}_T^+, T^+\right)^B p\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+, q_{ii,T}^+, T^+\right)\Big|\, \sigma_{E,i}\right]}{\left(\mathbb{E}_{T^-}\left[H\left(\hat{\theta}_T^+, T^+\right)\right]\right)^B}.$$

Proof. See Appendix A.5. □

In Appendix A.3, we show that the announcement SDF at $t_A \in \{\tau, T\}$ is given by $H(\hat{\theta}_{t_A}^+, t_A^+)^B / \left\{\mathbb{E}_{t_A^-}\left[H(\hat{\theta}_{t_A}^+, t_A^+)\right]\right\}^B$, where $B \equiv \frac{\frac{1}{\psi}-\gamma}{1-\gamma}$. Under the strong GRS condition $\gamma > 1 > 1/\psi$, we have $B > 0$. Since the continuation value H decreases in $\hat{\theta}_t$ while the price-to-dividend ratio increases in $\hat{\theta}_t$, it follows that: $\mathrm{Cov}\left(H(\hat{\theta}_{t_A}^+, t_A^+)^B,\ p(\hat{\theta}_{t_A}^+, \hat{g}_{i,t_A}^+, q_{ii,t_A}^+, t_A^+)\right) < 0$. At announcement times, investors' beliefs jump from $\hat{\theta}_{t_A}^-$ to $\hat{\theta}_{t_A}^+$ as new aggregate information is revealed, inducing contemporaneous movements in the SDF and asset prices. As a result, announcements require positive risk compensation. This mechanism generates positive *average* earnings announcement and macro announcement premia, consistent with the empirical evidence 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 relative to a benchmark "non-announcer," defined as the limiting case in which earnings announcements are completely uninformative. In our economy these non-announcers are present as actual firms: the N non-announcing firms carry the limiting type $\sigma_{E,i}^2 \to \infty$ and make up half of the market portfolio.

Definition 2. *(Repricing Premium) Conditioning on earnings signal noise $\sigma_{E,i}$, the repricing premium for firm i at macroeconomic announcement T is defined as:*

$$\pi_i^{Rep} \equiv \mathbb{E}_{T^-}\left[R_{M,i} \mid \sigma_{E,i}\right] - \mathbb{E}_{T^-}\left[R_{M,non}\right], \tag{23}$$

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

On macro days, the aggregate cash flow θ_T is fully revealed and constitutes a common source of risk for all firms. For non-announcers, firm-specific beliefs $\hat{g}_{i,T}$ are uncorrelated with $\hat{\theta}_T$. In this benchmark case, firms carry pure aggregate risk, yielding a zero repricing premium ($\pi_i^{Rep} = 0$).

However, as established in Proposition 1, the preceding earnings announcement induces a negative covariance, $\text{Cov}(\hat{\theta}_T^+, \hat{g}_{i,T}^+) < 0$, which acts as a partial *hedge* against aggregate risk. 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, in bad states, the firm receives an upward revision, cushioning the crash. Because the firm is less sensitive to aggregate shocks than the benchmark, it requires less risk compensation, resulting in a negative repricing premium ($\pi_i^{Rep} < 0$).

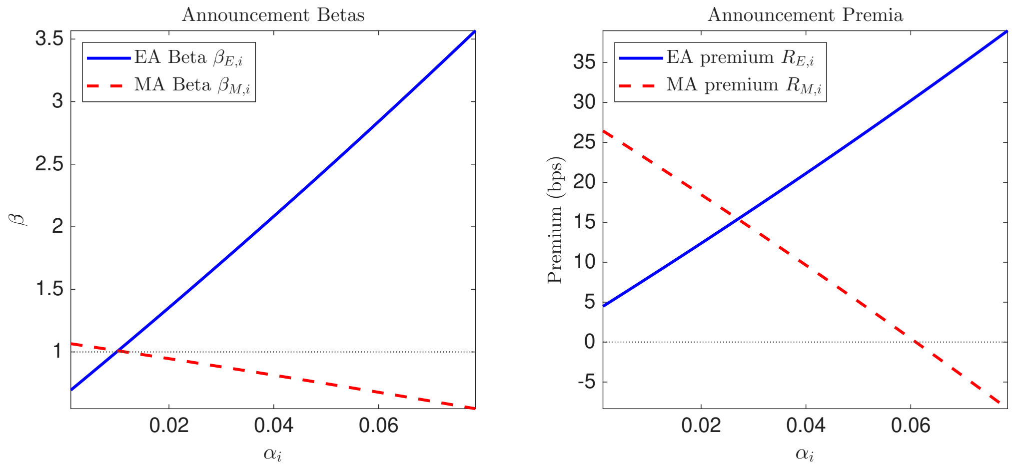
Crucially, the repricing premium is heterogeneous across firms. More informative earnings announcements (smaller $\sigma_{E,i}$) generate a stronger positive covariance $\text{Cov}(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+)$ at the earnings announcement, leading to a higher earnings-day beta $\beta_{E,i}$. Yet this same informativeness leads to a more negative covariance $\text{Cov}(\hat{\theta}_T^+, \hat{g}_{i,T}^+)$ 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 earnings informativeness 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.

Proposition 1 establishes that the covariance between aggregate and firm-specific cash flows is monotonic in informativeness of earnings announcement α_i. The left panel of Figure 1 illustrates the resulting beta dynamics. The earnings announcement beta $\beta_{E,i}$ (blue solid line) increases monotonically with α_i. Firms with more informative earnings announcements (high α_i) exhibit high $\beta_{E,i}$ because precise earnings news contains significant information about the aggregate condition; consequently, the firm's price becomes highly sensitive to aggregate news. In contrast, the macro announcement beta $\beta_{M,i}$ (red dashed line) decreases monotonically as α_i rises. This pattern reflects the repricing channel. For firms with highly informative earnings announcements, the sum $\theta + g_i$ is tightly pinned down prior to the macro announcement. When the macro announcement subsequently reveals the true aggregate

Figure 1: Earnings and Macro Announcement Betas and Risk Premia



The left panel plots the model-implied earnings announcement (EA) beta (blue solid line) and macro announcement (MA) beta (red dashed line) defined in Definition 1, as functions of the earnings-signal informativeness index α_i. 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.

state θ, investors revise their beliefs about firm-specific fundamentals g_i in the opposite direction. This "reverse learning" generates a strong negative beta for informative firms. As informativeness falls, this link weakens, and the beta increases.

The right panel of Figure 1 plots the corresponding expected returns. The pattern in risk premia mirrors the pattern in betas, confirming that the belief dynamics map directly into asset prices. The earnings-day risk premium (blue solid line) increases with α_i because more informative earnings announcements resolve greater uncertainty about aggregate conditions, requiring higher risk compensation. Conversely, the macro-day risk premium (red dashed line) is lower for stocks with informative recent earnings announcements. This illustrates the repricing premium. Because the repricing channel effectively turns more informative firms into a hedge against aggregate shocks—suffering valuation cuts in good times and enjoying upgrades in bad times—they command a lower required risk premium.

3.4 Timing and Recency: Distant vs. Recent Announcer

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 "Recent Announcer" (firm i) against a counterfactual "Distant Announcer" (firm j) to isolate the mechanism.

As before, we consider a representative announcement cycle over the interval $t \in (0, T]$, where $t = 0$ denotes the start of the cycle and $t = T$ denotes the arrival of the current macroeconomic announcement. The sequence of events is structured such that firm i announces immediately before the macro news, while firm j announces immediately after:

$$0 \longrightarrow \underbrace{\text{EA}_i \xrightarrow{\text{Pre-MA}} \text{MA} \xrightarrow{\text{Post-MA}} \text{EA}_j}_{\text{Cycle 1}} \longrightarrow \underbrace{\text{EA}_i \xrightarrow{\text{Pre-MA}} \text{MA} \xrightarrow{\text{Post-MA}} \text{EA}_j}_{\text{Cycle 2}} \longrightarrow \dots$$

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 maximizes 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 $q^+_{\theta g_i}(\tau_i) < 0$ precisely at the moment of the macro announcement, making the firm a partial hedge against the aggregate shock.

In contrast, consider firm j to be a distant announcer, defined as a firm scheduled to announce earnings at τ_j, immediately following the macro 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 (equivalent to $t = 0$). This timing schedule therefore implies that firm j's previous announcement occurred at the beginning of the current cycle ($t = 0$). Consequently, firm j is the "distant" announcer, as its earnings signal is the furthest away from the current macro announcement at time T.

This difference in timing leads to distinct asset pricing dynamics. Because the earnings signal arrives after the aggregate state θ_T is fully revealed, 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, 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 behaves identically to the "non-announcer" benchmark discussed earlier. The following proposition formalizes the belief dynamics for the distant announcer.

Proposition 3. *(Distant Announcer) Consider a distant announcer j whose earnings announcement occurs immediately after the macro announcement, i.e., $\tau_j^- = T^+$. Assume the macro announcement is fully revealing. Let the earnings signal be $s_{E,j}(\tau_j) = \theta_{\tau_j} + g_{j,\tau_j} + \epsilon_{E,j}$.*

Then, the conditional common-idiosyncratic covariance is zero:

$$\text{Cov}\left(\hat{\theta}_T^+, \hat{g}_{j,T}^+\right) = 0. \tag{24}$$

Furthermore, the posterior update for the firm-specific fundamental g_j reduces to a univariate Gaussian update:

$$\hat{g}_j^+(\tau_j) = \hat{g}_j^-(\tau_j) + \alpha_j \tilde{z}_j, \tag{25}$$

where $\alpha_j \equiv \frac{q_{jj}^-(\tau_j)}{q_{jj}^-(\tau_j)+\sigma_{E,j}^2}$, *and the innovation is* $\tilde{z}_j \equiv \left(s_{E,j}(\tau_j) - \theta_T\right) - \hat{g}_{j,\tau_j}^-$.

Proof. See Appendix A.4. □

4 Empirical Evidence and Quantitative Analysis

In this section, we calibrate the model to match key moments of aggregate consumption growth, asset returns, and announcement-day returns. 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 earnings announcers to non-announcers; (ii) analyzing the cross-sectional variation in the repricing premium driven by earnings informativeness; (iii) testing the implications of announcement timing; and (iv) providing direct 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. 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 TAQ are used to construct measures of stock-market comovement, including daily betas. We restrict the sample to non-financial firms and exclude firms with SIC codes between 6000 and 6999. 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). Consensus macroeconomic forecasts used to construct macroeconomic surprises are obtained from the Survey of Professional Forecasters. 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 B.2.5 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

Preference parameters follow the long run risk literature (e.g., Bansal and Yaron (2004); Ai and Bansal (2018)): risk aversion is $\gamma = 16$ and the IES is $\psi = 2$, and the subjective discount rate is $\rho = 0.5\%$. Aggregate consumption parameters ($\bar{\theta} = 1.35\%$, $\sigma_C = 2.1\%$, $a = 0.14$, $\sigma_\theta = 0.9\%$) 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), and the aggregate dividend shock $\sigma_u = 0.13$ matches its volatility (10.69% versus 11.06%), and the persistence $b = 0.05$ its autocorrelation (0.19 versus 0.31). We set $\sigma_D = 0.27$, calibrated to the idiosyncratic volatility of individual stock returns (0.25 versus 0.29). The two signal-noise bounds $\sigma_{E,i} \in [0.054, 0.46]$, distributed log-uniformly across firms, are set to the average earnings-announcement-day return (11.40 bps versus 12.02 bps) and the dispersion 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 well with both the asset market return and volatility moments in the data. 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%. 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	0.25	0.29
$\text{Std}[r]$	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

4.2 The Repricing Premium: Announcers vs. Non-Announcers

The first prediction 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 ($\sigma_{E,i} \to \infty$). As shown in Figure 1, these firms carry pure aggregate risk and earn higher premia. In contrast, recent announcers ($\sigma_{E,i} < \infty$) partially hedge aggregate risk because the revelation of aggregate news triggers an offsetting 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. 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, we impose the following restrictions. First, we exclude firms that announce earnings on the macro announcement day itself and retain only scheduled earnings announcements. Second, we construct the non-announcer portfolio to match the industry and size composition of the announcer portfolio. 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). To control for differences in unconditional CAPM exposure across portfolios, we report CAPM-neutral returns, computed by subtracting the product of the realized market return and each firm's estimated unconditional beta prior to aggregating within portfolios. We then form a long-short portfolio that is long non-announcers and short announcers.

We replicate the same exercise in simulated model data by constructing a portfolio of announcers (drawn from the calibrated signal distribution F_E) against a portfolio of non-announcers (consisting of firms with $\sigma_{E,i} \to \infty$). 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, $R_{M,i} - R_{M,M}$.

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

	Data (EW)	Data (VW)	Model
Non-Announcers (Long)	6.0	7.0	3.51
	(2.01)	(2.25)	
Announcers (Short)	-1.0	1.0	-3.51
	(-0.34)	(0.38)	
Long-short	**7.0**	**6.0**	**7.02**
	(3.42)	**(1.74)**	

This table reports daily CAPM-neutral returns (in basis points) for portfolios formed on macroeconomic announcement days. The short portfolio consists of firms that issued a scheduled earnings announcement within the prior 15 days. The long portfolio consists of firms without recent earnings announcements, matched to announcers by size and industry. Returns are adjusted by subtracting the unconditional CAPM beta times the market return. Equal-weighted (EW) and value-weighted (VW) returns are computed for each announcement day. The table reports time-series means with t-statistics in parentheses. The sample includes 429 macroeconomic announcement days over 1994–2024. The Model column reports the corresponding CAPM-neutral macro-announcement-day returns in the calibrated model, in which announcers draw their signal noise from F_E and non-announcers are the limiting type $\sigma^2_{E,i} \to \infty$; because every firm in the model has an unconditional CAPM beta of one, the model CAPM-neutral return is $R_{M,i} - R_{M,M}$.

Table 4 reports the results. On macroeconomic announcement days, firms with recent earnings announcements earn significantly lower returns than non-announcers, consistent with a negative repricing premium. The equal-weighted CAPM-neutral long-short spread (non-announcers minus announcers) is 7 bps ($t = 3.42$), and the value-weighted spread is 6 bps ($t = 1.74$); both are statistically significant. The calibrated model—in which these spreads are untargeted—generates a spread of 7.02 bps, driven by lower expected returns for announcers relative to non-announcers. One concern is that the repricing operates through discount-rate news rather than the cash-flow channel emphasized by our model. Appendix B.2.3 addresses this concern by decomposing FOMC-day monetary policy surprises into cash-flow and discount-rate components, following the Jarociński and Karadi (2020) classification and shows that this is not the case.

4.3 Cross-Sectional Repricing Premium

The second implication of the 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, the earnings announcement beta is strictly decreasing in signal noise $\sigma^2_{E,i}$ (or increasing in the informativeness index α_i), making it a natural empirical proxy for earnings informativeness. Firms with high earnings-day betas therefore experience stronger repricing when macroeconomic news arrives, resulting in more negative 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. In the data, by contrast, firms differ in their unconditional CAPM betas, and higher-beta firms earn higher returns on announcement days simply because favorable aggregate news raises expected cash flows for all firms (Savor and Wilson, 2014). Because our model abstracts from this heterogeneity in aggregate risk exposure, the focus of Ai, Han, Pan, and Xu (2022), we strip out the persistent, time-invariant component of beta and isolate the repricing channel by removing the unconditional CAPM component from both returns and betas.

We decompose a firm's return on the earnings announcement day into two components: a baseline, time-invariant CAPM exposure and an announcement-induced incremental component reflecting excess co-movement 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 interpret this excess co-movement as earnings-day excess beta, denoted by β^{EA}. A larger β^{EA} reflects an earnings announcement that is more informative about aggregate conditions; we therefore use β^{EA} as our empirical measure of earnings informativeness.

We estimate a realized unconditional CAPM β for stock i using intraday returns over the $T = 10$ trading days preceding the earnings announcement date:

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

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 k^{th} 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 β on the earnings announcement day alone ($t = T$), following Patton and Verardo (2012), using the same estimator over that day's intraday intervals:

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

and construct the firm's earnings-day excess beta, denoted $\beta_{i,T}^{\text{EA}}$, as the difference between this announcement-day beta and the unconditional CAPM beta:

$$\beta_{i,T}^{\text{EA}} = \tilde{\beta}_{i,T}^{\text{EA}} - \beta_i^{\text{CAPM}}. \tag{26}$$

This measure captures the component of the firm's announcement-day beta above its unconditional CAPM β.

We construct an analogous measure on macroeconomic announcement days, β^{MA}, as the same difference between the one-day macroeconomic-announcement-day beta and the two-week baseline beta. The earnings announcement-day β^{EA} serves as the sorting variable in our portfolio analysis, identifying firms whose earnings announcements convey the most information about aggregate conditions. According to our theory, a more informative earnings announcement will be associated with stronger belief revision on the macroeconomic announcement day, as measured by a lower β^{MA}.[8]

Empirical Test We sort firms that announced earnings within the prior 15 days into five portfolios based on their estimated 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}). Under the repricing channel, this strategy should earn positive returns on macroeconomic announcement days.

As discussed above, to control for unconditional CAPM exposure and isolate the repricing

[8]Early work shows that earnings information is incorporated slowly into prices (starting with Ball and Brown (1968)). More recent evidence in Martineau (2022) shows that in today's environment, earnings news is incorporated into prices much more quickly. In contrast, we show that investor responses to earnings depend on subsequent macroeconomic information: the earnings signal is quickly reflected in prices given the information available at the time, but its interpretation remains incomplete until macroeconomic announcements reveal the state of the broader economy.

channel, we focus on CAPM-neutral returns. For each stock, we remove the unconditional CAPM component by subtracting the product of the realized market return and the firm's estimated unconditional beta, β_i^{CAPM}. 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: Portfolio Performance Based on Earnings Informativeness

	P1	P2	P3	P4	P5	P1-P5
Panel A: CAPM β-Neutral Returns						
Data (EW)	16.00	7.00	6.00	-2.00	-6.00	**22.0**
	(2.92)	(1.81)	(1.69)	(-0.52)	(-1.04)	**(2.77)**
Data (VW)	17.00	7.00	0.00	-2.00	-6.00	**23.0**
	(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						
$\mathbb{E}[\beta^{\text{EA}}] - 1$	-4.44	-1.44	0.01	1.53	4.48	
	(-58.3)	(-31.1)	(0.57)	(28.6)	(59.2)	
Model	-0.28	-0.18	0.03	0.53	1.66	
$\mathbb{E}[\beta^{\text{MA}}] - 1$	0.29	0.05	-0.06	-0.17	-0.52	
	(9.47)	(2.32)	(-3.05)	(-7.93)	(-19.3)	
Model	0.06	0.04	0.00	-0.09	-0.29	

This table reports the performance of trading strategies based on earnings announcement informativeness, evaluated on macroeconomic announcement (MA) days. Firms are sorted into five portfolios (P1-P5) at each earnings announcement (EA) date based on their β^{EA}, defined as the component of the firm's announcement-day beta in excess of its unconditional CAPM beta (estimated via Equation (26)). 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 (with time-series t-statistics in parentheses), alongside the equal-weighted portfolio returns from the model simulation. Panel B reports the average β^{EA} and β^{MA} for each portfolio in both the data and the model. 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 matched-portfolio tables because the quintile sort requires a valid intraday beta; it covers 345 macroeconomic announcement days from 1994 to 2024.

Table 5 reports the results. Panel A documents a strong negative relationship between earnings informativeness 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 confirms the underlying mechanism: β^{EA} is negatively related to β^{MA}. Firms whose earnings announcements are most informative about aggregate conditions experience the strongest revision in idiosyncratic beliefs, leading to significantly lower (more negative) betas 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 22.0 bps (P1: 16.0 bps; P5: –6.0 bps). The model, with these moments untargeted, generates a comparable spread of 22.27 bps (P1: 3.71 bps; P5: -18.55 bps). Moreover, the associated betas display the predicted reversal: on earnings announcement days, betas increase with earnings informativeness, whereas on macroeconomic announcement days they decrease monotonically. This confirms that the repricing channel drives the observed cross-sectional return spread. Panel regressions in Appendix Table B.2 confirm that both announcement-day betas are priced in the cross-section.

4.4 Timing: Recent vs. Distant Announcers

The third implication of our model concerns the timing of the repricing effect. As shown in Proposition 3, earnings announcements released before macroeconomic news ("Recent Announcers," RA) should exhibit a repricing premium, whereas earnings announcements released 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 premium is absent.

To test this prediction, we compare recent announcers with distant announcers on macro announcement days, using the same sample construction as in Table 4. The recent-announcer portfolio consists of firms announcing earnings within five days before the macro event, while the distant-announcer portfolio consists of firms announcing within five days after the macro event. Because stock returns often exhibit systematic patterns around earnings announcements—such as pre- or post-announcement drift—independent of macroeconomic news, we adjust for these earnings lifecycle effects. Specifically, for each portfolio we subtract the average return earned by firms at the same relative earnings announcement timing in periods without macroeconomic announcements. These benchmark returns are estimated using earnings announcements that do not coincide with macro events. The resulting excess returns therefore isolate the effect of the macroeconomic announcement itself and cleanly identify the repricing premium. As in previous sections, we report CAPM-neutral returns by subtracting the product of the realized market return and each firm's estimated unconditional beta prior to aggregating within portfolios.

Table 6: Earnings Announcements Before and After Macroeconomic News

	EW (bps)	VW (bps)
Recent Announcers (RA)	-2.00	1.00
	(-0.53)	(0.43)
Distant Announcers (DA)	12.00	10.00
	(3.48)	(3.20)
DA − RA	**15.00**	**9.00**
	(5.61)	**(2.31)**

This table reports daily CAPM-neutral returns (in basis points) for portfolios formed on macroeconomic announcement days. Recent Announcers (RA) are firms with a scheduled earnings announcement within five days before the macroeconomic announcement. Distant Announcers (DA) are firms with a scheduled earnings announcement within five days after the macroeconomic announcement. Returns are adjusted by subtracting the 2-week CAPM beta times the market return. Portfolios are matched on size and industry. Equal-weighted (EW) and value-weighted (VW) returns are computed daily, and the table reports time-series means with t-statistics in parentheses. 429 MA days, 1994–2024.

Table 6 displays the results. Recent announcers earn significantly lower returns than distant announcers on macro announcement days. Recent announcers earn –2 bps (EW) and 1 bp (VW), while distant announcers earn higher returns of 12 bps (EW) and 10 bps (VW). The long-short portfolio that buys distant announcers and sells recent announcers (DA minus RA) gives a statistically significant spread of 15 bps (EW) and 9 bps (VW).

Note that the returns earned by distant announcers are very similar to those of the non-announcer portfolio reported in Table 4, consistent with the model's predictions. In both cases, firms earn the standard macro announcement risk premium, while recent announcers underperform due to the repricing effect.

In Appendix B.2.2, we present robustness tests showing that the repricing effect decays as earnings news becomes increasingly stale. We find that the negative relationship between earnings-day informativeness and subsequent macro-announcement-day betas is strongest for firms that announced earnings within the past week and attenuates for more distant announcements (one week to one month prior).

4.5 The Belief Revision Channel

Our model yields a precise structural prediction for how investors revise beliefs about firm-specific fundamentals on macroeconomic announcement days. Equation (12) establishes that for firms with recent earnings announcements, the update to idiosyncratic beliefs at the macroeconomic announcement satisfies:

$$\underbrace{\hat{g}_i^+(T) - \hat{g}_i^+(\tau)}_{\text{Rev}_{i,T}} = -\alpha_i \underbrace{\left(\theta_T - \hat{\theta}^+(\tau)\right)}_{\text{Surprise}_T}, \tag{27}$$

where $\alpha_i > 0$ for recent announcers due to the repricing mechanism, and $\alpha_i = 0$ 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 idiosyncratic 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 (12) is challenging because forecast revisions typically reflect both aggregate and firm-specific updates. In particular, forecast revisions may also reflect fundamental comovement: favorable macro news raises expected cash flows for many firms, while unfavorable news lowers them. Because this component contaminates raw forecast revisions, the level of revisions does not isolate the repricing channel. To separate the two, we compare recent announcers with firms that have not announced earnings recently. The latter group captures the baseline response to the macro shock, so the interaction isolates the additional response of recent announcers. We measure the macro surprise using the demeaned market return on the macroeconomic announcement day and estimate:

$$\text{Rev}_{i,t} = \beta_1 \tilde{r}_{M,t} + \beta_2 (\text{EA}_{i,t} \times \tilde{r}_{M,t}) + \beta_3 \text{EA}_{i,t} + \alpha_i + \delta_k + \varepsilon_{i,t}, \tag{28}$$

where $\text{Rev}_{i,t}$ is the analyst forecast revision for firm i scaled by the absolute value of actual EPS, $\tilde{r}_{M,t}$ is the demeaned market return (in percentage points), defined as the market return minus its trailing 21-day mean, $\text{EA}_{i,t} = 1$ if the firm had a recent earnings announcement, α_i are firm fixed effects, and δ_k are macroeconomic event-type fixed effects. The coefficient β_1 captures the baseline sensitivity of analyst revisions to the market-implied macro surprise for firms without recent earnings announcements. The interaction coefficient β_2 isolates the additional response for recent announcers. If macroeconomic news affected analyst forecasts only through this baseline response, the interaction coefficient would be zero. The repricing channel instead predicts $\beta_2 < 0$: a positive macro surprise leads analysts to reattribute part of the earlier earnings signal to aggregate conditions, so firm-specific expectations for recent announcers fall after netting out the baseline response.

Table 7: Analysts' Forecast Revisions

	$\text{Rev}_{i,t}$
β_1 (Benchmark)	0.0013
	(0.93)
β_2 (EA $\times$ $\tilde{r}_{M,t}$)	−0.0039
	(−2.00)
β_3 (EA level)	0.0162
	(6.69)
Observations	185,808
R^2	0.155
Firm FE	✓
Event-type FE	✓
Cluster (firm, date)	✓

This table reports estimates of Equation (28). The dependent variable is the analyst forecast revision scaled by the absolute value of actual EPS and truncated at the 1st and 99th percentiles. The market-implied macro surprise is $\tilde{r}_{M,t}$, the market excess return on the macroeconomic announcement day minus its trailing 21-day mean; for FOMC days the average of day-t and day-$t+1$ returns is used. $\text{EA}_{i,t} = 1$ if the firm had an earnings announcement within 30 days prior to the MA day. Events: GDP, UNEMP, FOMC. 1994--2024. t-statistics based on standard errors clustered two ways by firm and date are in parentheses.

Table 7 reports the results. The baseline coefficient β_1 is small and statistically insignificant (0.0013, $t = 0.93$). This indicates that the average analyst revision does not significantly co-move with market returns on macro announcement days after controlling for firm and event-type fixed effects. The main coefficient of interest is the interaction coefficient β_2, which isolates the recent-announcer response relative to this baseline and is negative and statistically significant (−0.0039, $t = -2.00$): after netting out the baseline response, analysts revise EPS expectations downward for recent announcers when the market response to the macro announcement is positive. This isolated differential response is the pattern predicted by the repricing channel.

Appendix B.2.4 reports a robustness check that replaces the announcement-day market-return proxy with standardized consensus forecast errors as the macro-surprise measure. The negative interaction remains, indicating that the belief-revision result is not driven by using market returns to proxy for macro news. In Appendix B.2.5, we provide additional evidence on analyst forecast revisions around macroeconomic announcement days. Analyst revision activity spikes on macro days, with the probability of a forecast update rising by about 1.5 percentage points even after controlling for earnings timing. Consistent with the repricing mechanism, this effect is strongest for firms with very recent earnings announcements and attenuates as earnings information becomes more distant.

5 Conclusion

In this paper, we identify and quantify a repricing channel of macroeconomic announcements. We demonstrate that aggregate news significantly reprices previously released firm-level earnings, generating substantial cross-sectional heterogeneity in risk premia. We formalize this mechanism in a dynamic general equilibrium model in which investors learn from both earnings and macroeconomic announcements. Our empirical analysis strongly supports the model's predictions: firms with recent earnings announcements earn significantly lower returns on macroeconomic announcement days than firms whose earnings information is stale. Accordingly, a strategy that goes long non-announcers and short announcers generates significantly positive returns on macroeconomic announcement days. Furthermore, using high-frequency earnings-day betas to proxy for earnings informativeness, we find that firms with the most informative earnings experience the strongest repricing. A long-short portfolio formed using these earnings-day betas earns about 22 to 23 basis points per macroeconomic announcement day, confirming the quantitative importance of the repricing channel.

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Appendix A: Model Solutions

A.1 Investors' Learning Problems

Learning between announcements This section summarizes how investors update their beliefs about the common (aggregate) cash flow component θ_t and the firm-specific components $\{g_{i,t}\}_{i=1}^{N}$. The learning problem is solved using a standard Kalman-Bucy filter. The aggregate dividend shock $B_{u,t}$ is observable as the common component of dividend growth and is uninformative about the latent states, so it does not enter the filtering problem. Applying Theorem 10.3 in Liptser and Shiryaev (2001), we characterize the resulting belief dynamics in the following lemma.

Lemma 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:

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

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

Note that in general, absent 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 macro, its law of motion keeps it at zero between that macro 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 we get "mixing" between θ and g_i is at the earnings announcement, because the signals load on both.

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

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

$$\hat{\theta}^+(\tau) = \hat{\theta}^-(\tau) + \frac{q_{\theta\theta}^-(\tau)}{1 + q_{\theta\theta}^-(\tau)s_\Sigma} \sum_{i=1}^{N} v_i z_i, \tag{A.8}$$

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

where $s_\Sigma \equiv \sum_{i=1}^N v_i$, $v_i \equiv [\, q_{ii}^-(\tau) + \sigma_{E,i}^2(\tau)\,]^{-1}$, and $z_i \equiv s_{E,i}(\tau) - (\hat{\theta}_\tau^- + \hat{g}_{i,\tau}^-)$.

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

$$q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)}{1 + q_{\theta\theta}^-(\tau)s_\Sigma}, \tag{A.10}$$

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

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

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

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

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

and the posterior variances satisfy

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

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 about 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 $\Sigma_E = \operatorname{diag}(\sigma_{E,1}^2, \ldots, \sigma_{E,N}^2)$. 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 $d_i \equiv q_{ii}^- + \sigma_{E,i}^2$. 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, 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":

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

so we can apply the 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, v are $n \times 1$ column vectors, then*

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

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

Let

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

Apply the Theorem, $A = \mathrm{diag}(d_1, \ldots, d_N)$, $u = \sqrt{q_{\theta\theta}^{-}}\mathbf{1}$, $v^\top = \sqrt{q_{\theta\theta}^{-}}\mathbf{1}^\top$. Therefore, $A^{-1} = V = \mathrm{diag}(v_1, \ldots, v_N)$.

$$v^\top A^{-1} u = \left(\sqrt{q_{\theta\theta}^{-}}\mathbf{1}^\top\right) V \left(\sqrt{q_{\theta\theta}^{-}}\mathbf{1}\right) = q_{\theta\theta}^{-}\mathbf{1}^\top V \mathbf{1} = q_{\theta\theta}^{-}\Sigma_{i=1}^{N} v_i = q_{\theta\theta}^{-} s_\Sigma,$$

and

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

Finally,

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

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

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

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

Therefore, the Kalman gain is

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

Finally, the Kalman gain can be summarized as

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

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

EA posterior means

For the common component, the update is

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

This says: pool all EA surprises across firms, weight them by their signal precisions v_i, and scale by the prior uncertainty about θ.

For each idiosyncratic component g_i, start from the general expression

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

Factoring out $q_{ii}^- v_i$ and defining the EA precision loadings

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

we get the compact form

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

The first term $\alpha_i z_i$ is exactly the usual "precision-weighted own surprise" if firm i's EA only conveyed information about g_i. The second term subtracts the part of that surprise that the joint set of EAs says is actually a surprise about the common component θ. The economic intuition is: The more precise firm i's signal is (the bigger α_i), the more heavily its signal was used to pin down θ, and therefore the more we have to remove from the idiosyncratic part. That is why the same common update $\Delta\hat{\theta}(\tau)$ is scaled by α_i when we clean up firm i's estimate. Equivalently, each $\Delta\hat{g}_i =$ (own precision-weighted surprise) $-$ (the piece reattributed to the common θ), where the reattribution weight is $\frac{q_{\theta\theta}^-}{1+q_{\theta\theta}^- s_\Sigma}$.

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:

$$q_{\theta\theta}^{+}(\tau) = q_{\theta\theta}^{-} - \frac{(q_{\theta\theta}^{-})^2 s_\Sigma}{1 + q_{\theta\theta}^{-} s_\Sigma} = \frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} s_\Sigma}. \tag{A.23}$$

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

$$q_{ij}^{+}(\tau) = \frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} s_\Sigma} q_{ii}^{-} q_{jj}^{-} v_i v_j = \alpha_i \alpha_j q_{\theta\theta}^{+} > 0. \tag{A.24}$$

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 $q_{ij}^{+} > 0$.

Idiosyncratic variances:

$$q_{ii}^{+}(\tau) = q_{ii}^{-} - (q_{ii}^{-})^2 \left(v_i - \frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} s_\Sigma} v_i^2 \right) = q_{ii}^{-}(1 - \alpha_i) + \alpha_i^2 q_{\theta\theta}^{+}. \tag{A.25}$$

This equation shows that each firm's idiosyncratic variance falls by $(1 - \alpha_i)$ because part of g_i is learned from its own EA, with a small add-back $\alpha_i^2 q_{\theta\theta}^{+}$ since the EA mixes common and firm-specific news, letting residual uncertainty about θ "leak" into g_i. In limiting cases, if all EAs are very precise or 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:

$$q_{\theta g_i}^{+}(\tau) = -\frac{q_{\theta\theta}^{-}}{1 + q_{\theta\theta}^{-} s_\Sigma} q_{ii}^{-} v_i = -\alpha_i q_{\theta\theta}^{+} < 0, \tag{A.26}$$

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 $T^{-} = \tau^{+}$, and suppose the macro announcement at T reveals θ_T through

$$s_M = \theta_T + \varepsilon_M, \qquad \varepsilon_M \sim \mathcal{N}(0, \sigma_M^2),$$

and we take the fully revealing case $\sigma_M^2 \to 0$. The following summarizes the posterior beliefs.

For a finite σ_M^2, the usual Gaussian update gives

$$\hat{\theta}_T^{+} = \hat{\theta}_\tau^{+} + \frac{q_{\theta\theta}^{+}(\tau)}{q_{\theta\theta}^{+}(\tau) + \sigma_M^2}\big(s_M - \hat{\theta}_\tau^{+}\big), \qquad \hat{g}_i^{+}(T) = \hat{g}_i^{+}(\tau) + \frac{q_{\theta g_i}^{+}(\tau)}{q_{\theta\theta}^{+}(\tau) + \sigma_M^2}\big(s_M - \hat{\theta}_\tau^{+}\big). \quad \text{(A.27)}$$

Letting $\sigma_M^2 \to 0$ and using $q_{\theta g_i}^{+}(\tau) = -\alpha_i q_{\theta\theta}^{+}(\tau)$, we obtain

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

So 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 α_i.

A fully revealing macro 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 variances, apply the standard Gaussian projection step to the g-block:

$$\Sigma_{ii}(T) = \Sigma_{ii}(\tau) - \Sigma_{g_i\theta}(\tau)\big(q_{\theta\theta}^{+}(\tau)\big)^{-1}\Sigma_{\theta g_i}(\tau).$$

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

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

and, for the diagonals,

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

Thus, immediately after the macro, 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,

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

By the law of total covariance, the 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,

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

At the macro announcement, with $T^- = \tau^+$, Equation (A.27) gives

$$\text{Cov}\left(\hat{\theta}^+_T, \hat{g}^+_{i,T}\right) = \frac{q^+_{\theta\theta}(\tau)}{q^+_{\theta\theta}(\tau) + \sigma^2_M} \frac{q^+_{\theta g_i}(\tau)}{q^+_{\theta\theta}(\tau) + \sigma^2_M} \text{Var}\left(s_M - \hat{\theta}^+_\tau\right) = \frac{q^+_{\theta\theta}(\tau)\, q^+_{\theta g_i}(\tau)}{q^+_{\theta\theta}(\tau) + \sigma^2_M} \leq 0. \tag{A.31}$$

since $q^+_{\theta g_i}(\tau) \leq 0$. In the fully revealing case $\sigma_M = 0$,

$$\text{Cov}\left(\hat{\theta}^+_T, \hat{g}^+_{i,T}\right) = q^+_{\theta g_i}(\tau) = -\alpha_i q^+_{\theta\theta}(\tau) \leq 0. \tag{A.32}$$

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

$$\frac{d\text{Cov}\left(\hat{\theta}^+_\tau, \hat{g}^+_{i,\tau}\right)}{d\sigma^2_{E,i}} \leq 0, \qquad \frac{d\text{Cov}\left(\hat{\theta}^+_T, \hat{g}^+_{i,T}\right)}{d\sigma^2_{E,i}} \geq 0. \tag{A.33}$$

The inequalities are strict whenever $\sigma^2_{E,i} < \infty$, i.e., $\alpha_i > 0$.

A.2 The Value Function of the Representative Agent

In this subsection, we derive the solution to 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 preference is 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:

$$dV_t = [-f(C_t, V_t) - \frac{1}{2}\mathcal{A}(V_t)||\sigma_V(t)||^2]dt + \sigma_V(t)dB_t \tag{A.34}$$

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 $\bar{f}$ as the normalized aggregator. Under this normalization, for $\psi \neq 1$, $\bar{f}(C_t, V_t)$ is defined as:

$$\bar{f}(C_t, V_t) = \frac{\rho}{1-1/\psi} \frac{C_t^{1-1/\psi} - ((1-\gamma) V_t)^{\frac{1-1/\psi}{1-\gamma}}}{((1-\gamma) V_t)^{\frac{1-1/\psi}{1-\gamma}-1}}. \tag{A.35}$$

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

$$\bar{f}\left(C_t, V\left(\hat{\theta}, t, C_t\right)\right) + \mathcal{L}\left[V\left(\hat{\theta}, t, C_t\right)\right] = 0, \tag{A.36}$$

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

$$V\left(\hat{\theta}_t, t, C_t\right) = \frac{1}{1-\gamma} H\left(\hat{\theta}_t, t\right) C_t^{1-\gamma}, \tag{A.37}$$

where

$$\frac{dC_t}{C_t} = \hat{\theta}_t dt + \sigma_C d\hat{B}_{C,t} \tag{A.38}$$

$$d\hat{\theta}_t = a\left(\bar{\theta} - \hat{\theta}_t\right) dt + \frac{q_{\theta\theta}(t)}{\sigma_C} d\hat{B}_{C,t} \tag{A.39}$$

The following lemma summarizes the solution to the value function, with details for numerical solutions available in Appendix B.2.5.

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

$$\begin{aligned} 0 = & \frac{1}{H(1-\gamma)} \left\{ H_t + H_\theta \left[a\left(\bar{\theta} - \hat{\theta}_t\right) + (1-\gamma) q_{\theta\theta} \right] + \frac{1}{2} H_{\theta\theta} \frac{q_{\theta\theta}^2}{\sigma_C^2} \right\} \\ & + \frac{\rho}{1-\frac{1}{\psi}} \left(H^{-\frac{1-\frac{1}{\psi}}{1-\gamma}} - 1 \right) + \left(\hat{\theta}_t - \frac{1}{2}\gamma\sigma_C^2 \right) \end{aligned} \tag{A.40}$$

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

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

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

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

$$H\left(\hat{\theta}_T^-, T^-\right) = \mathbb{E}\left[H\left(\hat{\theta}_T^+, T^+\right) \mid \hat{\theta}_T^-, T^-\right] = \int_{-\infty}^{+\infty} H\left(\hat{\theta}_T^+, T^+\right) \phi_1\left(\hat{\theta}_T^+\right) d\hat{\theta}_T^+, \tag{A.42}$$

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.40).

We have two boundary conditions at both the earnings and the macro announcement. First, after earnings announcement, the boundary condition satisfies Equation (A.41), where $\hat{\theta}_\tau^+ \sim \mathcal{N}\left(\hat{\theta}_\tau^-, q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau)\right)$, in which $q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau)$ reflects the posterior variance drop upon earnings announcement. With N firms announcing at τ, the posterior $q_{\theta\theta}^+(\tau)$ is $q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)}{1+q_{\theta\theta}^-(\tau) s_\Sigma}$ from Equation (A.10). Hence the posterior variance drop is: $q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)^2 s_\Sigma}{1+q_{\theta\theta}^-(\tau) s_\Sigma}$.

Second, after the macro announcement at T, the boundary condition satisfies Equation (A.42), 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 section, we begin by deriving the pricing kernel for the representative investor. 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 earnings and macro announcement. Finally, we calculate the cumulative return and the risk premium.

Pricing kernel and the risk-free rate We first provide a proof for the law of motion of the pricing kernel, which satisfies the stochastic differential equation (SDE) of Equation

(18), where the risk free rate r_t and price of risk $\sigma_M(\hat{\theta}_t, t)$ are

$$r\left(\hat{\theta}_t, t\right) = \rho + \frac{1}{\psi}\hat{\theta}_t - \frac{\gamma\sigma_C^2}{2}\left(\frac{1}{\psi}+1\right) + \frac{\frac{1}{\psi}-\gamma}{1-\gamma}\frac{H_\theta}{H}q_{\theta\theta} + \frac{\left(\frac{1}{\psi}-\gamma\right)\left(1-\frac{1}{\psi}\right)}{2\left(1-\gamma\right)^2}\left(\frac{H_\theta}{H}\frac{q_{\theta\theta}}{\sigma_C}\right)^2 \tag{A.43}$$

$$\sigma_M\left(\hat{\theta}_t, t\right) = \gamma\sigma_C - \frac{\frac{1}{\psi}-\gamma}{1-\gamma}\frac{H_\theta}{H}\frac{q_{\theta\theta}}{\sigma_C}, \tag{A.44}$$

where we use notations $\frac{H_\theta}{H} = \frac{\partial H(\hat{\theta}_t,t)/\partial\hat{\theta}_t}{H(\hat{\theta}_t,t)}$ 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

$$\frac{dM_t}{M_t} = \frac{d\bar{f}_C\left(C,V\right)}{\bar{f}_C\left(C,V\right)} + \bar{f}_V\left(C,V\right)dt, \tag{A.45}$$

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:

$$\begin{aligned}
\frac{d\bar{f}_C\left(C,V\right)}{\bar{f}_C\left(C,V\right)} &= \frac{d[H^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}}C_t^{-\gamma}]}{H^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}}C_t^{-\gamma}} = \Bigg\{-\gamma\hat{\theta}_t + \frac{1}{2}\gamma\left(\gamma+1\right)\sigma_C^2 - \gamma\frac{\frac{1}{\psi}-\gamma}{1-\gamma}\frac{H_\theta}{H}q_{\theta\theta} \\
&\quad + \frac{\frac{1}{\psi}-\gamma}{1-\gamma}\left[\frac{H_t}{H} + \frac{H_\theta}{H}a\left(\bar{\theta}-\hat{\theta}_t\right)\right] + \frac{1}{2}\frac{\frac{1}{\psi}-\gamma}{1-\gamma}\left(\frac{\frac{1}{\psi}-1}{1-\gamma}\frac{H_\theta^2}{H^2} + \frac{H_{\theta\theta}}{H}\right)\frac{q_{\theta\theta}^2}{\sigma_C^2}\Bigg\}dt \\
&\quad + \left(-\gamma\sigma_C + \frac{\frac{1}{\psi}-\gamma}{1-\gamma}\frac{H_\theta}{H}\frac{q_{\theta\theta}}{\sigma_C}\right)d\hat{B}_{C,t}.
\end{aligned} \tag{A.46}$$

Matching the drift and diffusion of Equation (18), we can get (A.44) and the risk-free rate

$$\begin{aligned}
r_t &= -\frac{\frac{1}{\psi}-\gamma}{\left(1-\gamma\right)H}\left[H_t + H_\theta a\left(\bar{\theta}-\hat{\theta}_t\right) + \frac{1}{2}\left(\frac{\frac{1}{\psi}-1}{1-\gamma}\frac{H_\theta^2}{H} + H_{\theta\theta}\right)\frac{q_{\theta\theta}^2}{\sigma_C^2} - \gamma H_\theta q_{\theta\theta}\right] \\
&\quad + \gamma\hat{\theta}_t - \frac{1}{2}\gamma\left(\gamma+1\right)\sigma_C^2 - \rho\frac{\frac{1}{\psi}-\gamma}{1-\frac{1}{\psi}}H^{-\frac{1-\frac{1}{\psi}}{1-\gamma}} + \rho\frac{1-\gamma}{1-\frac{1}{\psi}}.
\end{aligned} \tag{A.47}$$

Using the HJB equation to simplify r_t by multiplying $\frac{1}{\psi}-\gamma$ on both sides of (A.40),

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

and adding up with (A.47), we obtain the instantaneous risk-free rate in Equation (A.43). □

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 B.2.5.

Lemma 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 PDE of*

$$\varpi\left(\hat{\theta}_t, \hat{g}_{i,t}, t\right)p = 1 + p_t + p_\theta\varrho\left(\hat{\theta}_t, t\right) + p_g\vartheta\left(\hat{g}_{i,t}, q_{ii}, t\right) + \frac{1}{2}p_{\theta\theta}\frac{q_{\theta\theta}^2}{\sigma_C^2} + \frac{1}{2}p_{gg}\frac{q_{ii}^2}{\sigma_D^2} + p_q\zeta\left(q_{ii}\right) \quad \text{(A.48)}$$

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

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

The boundary condition at the earnings announcement τ satisfies

$$\tilde{p}\left(\sigma_{E,i};\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,q_{ii,\tau}^-,\tau^-\right)=\frac{\int\int e^{B\ln H\left(\hat{\theta}_\tau^+,\tau^+\right)+\ln p\left(\hat{\theta}_\tau^+,\hat{g}_{i,\tau}^+,q_{ii,\tau}^+,\tau^+\right)}\phi\left(\hat{\theta}_\tau^+,\hat{g}_{i,\tau}^+\middle|\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,\Delta\Sigma_{E,i}\right)d\hat{\theta}_\tau^+d\hat{g}_{i,\tau}^+}{\left[\int e^{\ln H\left(\hat{\theta}_\tau^+,\tau^+\right)}\phi_1\left(\hat{\theta}_\tau^+\middle|\hat{\theta}_\tau^-,q_{\theta\theta}^-(\tau)-q_{\theta\theta}^+(\tau)\right)d\hat{\theta}_\tau^+\right]^B},\tag{A.49}$$

$$p\left(\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,q_{ii,\tau}^-,\tau^-\right)=\sum_{n=1}^{N}\frac{1}{N}\tilde{p}\left(\sigma_{E,n};\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,q_{ii,\tau}^-,\tau^-\right),\tag{A.50}$$

where $B=\frac{\frac{1}{\psi}-\gamma}{1-\gamma}$, $\Delta\Sigma_{E,i}=\begin{bmatrix}q_{\theta\theta}^-(\tau)-q_{\theta\theta}^+(\tau) & \alpha_i q_{\theta\theta}^+(\tau)\\ \alpha_i q_{\theta\theta}^+(\tau) & \alpha_i q_{ii}^-(\tau)-\alpha_i^2 q_{\theta\theta}^+(\tau)\end{bmatrix}$, *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 $\tilde{p}\left(\sigma_E\to\infty;\cdot\right)$.*

The boundary condition at the macroeconomic announcement T satisfies

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

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

Proof. The present value relationship (19) implies

$$M_tD_{i,t}dt+\mathcal{L}\left[M_tp\left(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t\right)D_{i,t}\right]=0.\tag{A.51}$$

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 (18),

$$\begin{aligned}\frac{\mathcal{L}\left[M_tp(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t)D_{i,t}\right]}{M_tp(\hat{\theta}_t,\hat{g}_{i,t},q_{ii,t},t)D_{i,t}} &= -r_t+\frac{1}{p}\left[p_t+p_\theta a\left(\bar{\theta}-\hat{\theta}_t\right)+\frac{1}{2}p_{\theta\theta}\frac{q_{\theta\theta}^2}{\sigma_C^2}+p_gb\left(\bar{g}-\hat{g}_{i,t}\right)\right.\\ &\left.+\frac{1}{2}p_{gg}\frac{q_{ii}^2}{\sigma_D^2}+p_q\left(\sigma_g^2-2bq_{ii}-\frac{q_{ii}^2}{\sigma_D^2}\right)\right]+\left(\hat{g}_{i,t}+\hat{\theta}_t\right)\quad\text{(A.52)}\\ &-\sigma_M\left(\sigma_C+\frac{p_\theta}{p}\frac{q_{\theta\theta}}{\sigma_C}\right)+\frac{p_\theta}{p}q_{\theta\theta}+\frac{p_g}{p}q_{ii}.\quad\text{(A.53)}\end{aligned}$$

Plugging in r_t from (A.43) would give the PDE for $p(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t)$.

We next solve the boundary conditions at the announcements, both at the earnings and macro announcement. In order to price the asset at the announcement, we need the announcement SDF. Another way to write Equation (A.45) is: $M_t = f_C\left(C_t, V_t\right) e^{\int_0^t f_V(C_s,V_s)ds}$. From this formula, we can derive the announcement SDF as $\frac{H(\hat{\theta}_T^+,0)^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}}}{\mathbb{E}\left[H(\hat{\theta}_T^+,0)\middle|\hat{\theta}_T^-,T\right]^{\frac{\frac{1}{\psi}-\gamma}{1-\gamma}}}$. 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

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

is positive semidefinite. Also define $B = \frac{\frac{1}{\psi}-\gamma}{1-\gamma}$. As before, denote ϕ_1 the marginal density for $\hat{\theta}$, and further define ϕ 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. Define the earnings announcement posterior variance drop at τ for (θ, g_i): $\begin{pmatrix} \hat{\theta}^+(\tau) \\ \hat{g}_i^+(\tau) \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} \hat{\theta}^-(\tau) \\ \hat{g}_i^-(\tau) \end{pmatrix}, \Delta\Sigma_{E,i} \right)$. Using the boundary conditions in Equations (A.10) to (A.12), we have

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

Or equivalently,

$$\begin{aligned}
\Delta q_{\theta\theta}(\tau) &= q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau) = \frac{\left(q_{\theta\theta}^-(\tau)\right)^2 s_\Sigma}{1 + q_{\theta\theta}^-(\tau) s_\Sigma}, \\
\Delta q_{\theta g_i}(\tau) &= q_{\theta g_i}^-(\tau) - q_{\theta g_i}^+(\tau) = 0 - \left(- \alpha_i q_{\theta\theta}^+(\tau)\right) = \alpha_i q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau) q_{ii}^-(\tau)}{\left(1 + q_{\theta\theta}^-(\tau) s_\Sigma\right)} v_i, \\
\Delta q_{ii}(\tau) &= q_{ii}^-(\tau) - q_{ii}^+(\tau) = q_{ii}^-(\tau) - \left(q_{ii}^-(\tau)(1-\alpha_i) + \alpha_i^2 q_{\theta\theta}^+(\tau)\right) = \alpha_i q_{ii}^-(\tau) - \alpha_i^2 q_{\theta\theta}^+(\tau) \\
&= \left(q_{ii}^-(\tau)\right)^2 \left(v_i - v_i^2 q_{\theta\theta}^+(\tau)\right) = \left(q_{ii}^-(\tau)\right)^2 v_i \left[1 - \frac{v_i q_{\theta\theta}^-(\tau)}{1 + q_{\theta\theta}^-(\tau) s_\Sigma}\right].
\end{aligned}$$

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

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

We understand the above boundary condition in two steps.

Step 1. Condition on a realization of $\sigma_{E,i}^{2}$.

On each earnings announcement day τ, we draw a random permutation $\sigma_{E,i}^{2}(\tau)$ from $F_{E}=\left\{\sigma_{E,1}^{2},\ldots,\sigma_{E,N}^{2}\right\}$. Investors know the distributions F_{E}, so they can update their beliefs about the associated distribution of $\hat{g}_{i}^{+}(\tau)$ according to Equation (A.54), conditioning on a given $\sigma_{E,i}^{2}\in F_{E}$. It is useful to denote this intermediate step as:

$$\begin{aligned}\tilde{p}\left(\sigma_{E,i};\hat{\theta}_{\tau}^{-},\hat{g}_{i,\tau}^{-},q_{ii,\tau}^{-},\tau^{-}\right)&=\mathbb{E}\left[\left.\frac{H\left(\hat{\theta}_{\tau}^{+},\tau^{+}\right)^{B}p\left(\hat{\theta}_{\tau}^{+},\hat{g}_{i,\tau}^{+},q_{ii,\tau}^{+},\tau^{+}\right)}{\left(\mathbb{E}\left[H\left(\hat{\theta}_{\tau}^{+},\tau^{+}\right)\mid\hat{\theta}_{\tau}^{-},\tau^{-}\right]\right)^{B}}\right|\sigma_{E,i},\hat{\theta}_{\tau}^{-},\hat{g}_{i,\tau}^{-},q_{ii,\tau}^{-},\tau^{-}\right]\\&=\frac{\iint H\left(\hat{\theta}_{\tau}^{+},\tau^{+}\right)^{B}p\left(\hat{\theta}_{\tau}^{+},\hat{g}_{i,\tau}^{+},q_{ii,\tau}^{+},\tau^{+}\right)\phi\left(\hat{\theta}_{\tau}^{+},\hat{g}_{i,\tau}^{+}\middle|\hat{\theta}_{\tau}^{-},\hat{g}_{i,\tau}^{-},\Delta\Sigma_{E,i}\right)d\hat{\theta}_{\tau}^{+}d\hat{g}_{i,\tau}^{+}}{\left[\int_{-\infty}^{+\infty}H\left(\hat{\theta}_{\tau}^{+},\tau^{+}\right)\phi_{1}\left(\hat{\theta}_{\tau}^{+}\middle|\hat{\theta}_{\tau}^{-},\Delta q_{\theta\theta}(\tau)\right)d\hat{\theta}_{\tau}^{+}\right]^{B}}\\&=\frac{\iint e^{B\ln H\left(\hat{\theta}_{\tau}^{+},\tau^{+}\right)+\ln p\left(\hat{\theta}_{\tau}^{+},\hat{g}_{i,\tau}^{+},q_{ii,\tau}^{+},\tau^{+}\right)}\phi\left(\hat{\theta}_{\tau}^{+},\hat{g}_{i,\tau}^{+}\middle|\hat{\theta}_{\tau}^{-},\hat{g}_{i,\tau}^{-},\Delta\Sigma_{E,i}\right)d\hat{\theta}_{\tau}^{+}d\hat{g}_{i,\tau}^{+}}{\left[\int e^{\ln H\left(\hat{\theta}_{\tau}^{+},\tau^{+}\right)}\phi_{1}\left(\hat{\theta}_{\tau}^{+}\middle|\hat{\theta}_{\tau}^{-},\Delta q_{\theta\theta}(\tau)\right)d\hat{\theta}_{\tau}^{+}\right]^{B}}\end{aligned}$$

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

We compute the unconditional expectation by averaging over all possible realizations of $\sigma_{E,i}^{2}$. This step allows us to derive the expected value function based on the information set $\left\{\hat{\theta}_{\tau}^{-},\hat{g}_{i,\tau}^{-},q_{ii,\tau}^{-},\tau^{-}\right\}$ right before the announcement. Since the probability for each $\sigma_{E,i}^{2}$ is $1/N$, this gives

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

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 $q^+_{\theta\theta}(\tau) = \dfrac{q^-_{\theta\theta}(\tau)}{1 + q^-_{\theta\theta}(\tau) s_\Sigma}$, $\alpha_i = \frac{q^-_{ii}(\tau)}{q^-_{ii}(\tau)+\sigma^2_{E,i}}$, $s_\Sigma = \sum_{j=1}^N \frac{1}{q^-_{jj}(\tau)+\sigma^2_{E,j}}$. The macro day posterior 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

$$\Delta\Sigma_{M,i} = \begin{pmatrix} \Delta q_{\theta\theta}(T) & \Delta q_{\theta g_i}(T) \\ \Delta q_{\theta g_i}(T) & \Delta q_{ii}(T) \end{pmatrix} = \begin{pmatrix} q^+_{\theta\theta}(\tau) & -\alpha_i q^+_{\theta\theta}(\tau) \\ -\alpha_i q^+_{\theta\theta}(\tau) & \alpha_i^2 q^+_{\theta\theta}(\tau) \end{pmatrix}, \tag{A.55}$$

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

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:

$$\hat{g}^+_i(T) = \hat{g}^-_i(T) - \alpha_i\big(\hat{\theta}^+_T - \hat{\theta}^-_T\big). \tag{A.56}$$

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 $\sigma^2_{E,i}$, the distribution of $\hat{\theta}^+ \sim \mathcal{N}\big(\hat{\theta}^-_T, q^+_{\theta\theta}(\tau)\big)$. This intermediate step $\tilde{p}\left(\sigma_{E,i}; \hat{\theta}^-_T, \hat{g}^-_{i,T}, q^-_{ii,T}, T^-\right)$ can be computed as

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

Next, we compute the unconditional expectation by averaging over all possible realizations of $\sigma_{E,i}^2$:

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

□

Risk premium Conjecture the compensated cumulated return of the following form

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

The cumulative return can be computed as

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

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

Therefore,

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

$$\sigma_{RC}\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) = \sigma_C + \frac{p_\theta}{p}\frac{q_{\theta\theta}}{\sigma_C} \tag{A.59}$$

$$\sigma_{RD}\left(\hat{\theta}_t, \hat{g}_{i,t}, q_{ii,t}, t\right) = \sigma_D + \frac{p_g}{p}\frac{q_{ii}}{\sigma_D} \tag{A.60}$$

Together with the pricing kernel, the risk premium is therefore

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

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 and Recency

Proof of Proposition 3 We prove the result using standard properties of conditional normal distributions. At time τ_j^- (which corresponds to T^+), the macro announcement fully reveals the aggregate state. Therefore, θ is effectively a known constant given information at τ_j^-:

$$\hat{\theta}^-_{\tau_j}=\theta_T \quad \text{and} \quad q^-_{\theta\theta}(\tau_j)=0.$$

The conditional covariance between a constant (θ_{τ_j}) and a random variable (g_{j,τ_j}) is immediately zero: $\mathrm{Cov}_{\tau_j^-}(\theta_{\tau_j},g_{j,\tau_j})=\mathbb{E}\big[(\theta_{\tau_j}-\mathbb{E}[\theta_{\tau_j}\mid\tau_j^-])(\cdot)\mid\tau_j^-\big]=0$. Since the earnings signal $s_{E,j}(\tau_j)$ is observed after θ_T is already known, observing it cannot create new uncertainty about θ or generate correlation between θ and g_{j,τ_j}. Therefore, the posterior common-idiosyncratic covariance remains zero:

$$q^+_{\theta g_j}(\tau_j)=0.$$

Moreover, since $\hat{\theta}^+_{\tau_j}=\theta_T$ is constant in the conditioning set, it has zero variance, implying

$$\mathrm{Cov}(\hat{\theta}^+_{\tau_j},\hat{g}^+_{j,\tau_j})=0. \tag{A.61}$$

Next, the earnings signal is given by: $s_{E,j}(\tau_j)=\theta_{\tau_j}+g_{j,\tau_j}+\epsilon_{E,j}$. Because $\theta_{\tau_j}=\theta_T$ is known at the time of the earnings announcement, investors can perfectly subtract it from the signal to isolate the firm-specific component. Define the residual (post-MA) signal:

$$\tilde{s}_{j,E}\equiv s_{E,j}(\tau_j)-\theta_T=g_{j,\tau_j}+\epsilon_{E,j}.$$

This reduces the inference problem to a standard one-dimensional signal-extraction problem:

estimating g_{j,τ_j} given a noisy observation $\tilde{s}_{j,E}$. The standard Gaussian update yields

$$\hat{g}_j^+(\tau_j) = \hat{g}_j^-(\tau_j) + \frac{q_{jj}^-(\tau_j)}{q_{jj}^-(\tau_j) + \sigma_{E,j}^2}\left(\tilde{s}_{j,E} - \hat{g}_j^-(\tau_j)\right) = \hat{g}_j^-(\tau_j) + \alpha_j \tilde{z}_j,$$

where $\alpha_j \equiv \frac{q_{jj}^-(\tau_j)}{q_{jj}^-(\tau_j)+\sigma_{E,j}^2}$, and $\tilde{z}_j \equiv \tilde{s}_{j,E} - \hat{g}_j^-(\tau_j) = s_{E,j}(\tau_j) - \theta_T - \hat{g}_j^-(\tau_j)$.

Finally, the posterior variance follows from the standard conditional-normal formula:

$$q_{jj}^+(\tau_j) = \left(\frac{1}{q_{jj}^-(\tau_j)} + \frac{1}{\sigma_{E,j}^2}\right)^{-1} = \frac{q_{jj}^-(\tau_j)\,\sigma_{E,j}^2}{q_{jj}^-(\tau_j) + \sigma_{E,j}^2} = (1-\alpha_j)\, q_{jj}^-(\tau_j). \tag{A.62}$$

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 announcers, whose $\sigma_{E,i}$ are drawn from F_E, and the N non-announcers, which correspond to the limiting type $\sigma_{E,i} \to \infty$ ($\alpha_i = 0$). For an announcement event $x \in \{E, M\}$ (EA or MA), define each firm's gross event return $R_{x,i} \equiv \frac{p_i(t_x^+)}{p_i(t_x^-)}$, where $t_E = \tau$ and $t_M = T$. The market event return is the equal-weighted average: $R_{x,M} \equiv \frac{1}{2N}\sum_{j=1}^{2N} R_{x,j}$. Conditioning on firm i's earnings precision $\sigma_{E,i}$, the announcement beta is

$$\beta_{x,i} \mid \sigma_{E,i} \equiv \frac{\mathrm{Cov}\big(R_{x,i}, R_{x,M} \mid \sigma_{E,i}\big)}{\mathrm{Var}\big(R_{x,M} \mid \sigma_{E,i}\big)}.$$

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

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

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

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

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

The market mean is

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

The cross moment

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

where

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

The second moment

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

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

$$\beta_{E,i}|\sigma_{E,i} = \frac{\mathbb{E}\left[R_{E,i}R_{E,M} \mid \sigma_{E,i}\right] - \mathbb{E}\left[R_{E,i} \mid \sigma_{E,i}\right]\mathbb{E}\left[R_{E,M} \mid \sigma_{E,i}\right]}{\mathbb{E}\left[(R_{E,M})^2 \mid \sigma_{E,i}\right] - \left(\mathbb{E}\left[R_{E,M} \mid \sigma_{E,i}\right]\right)^2}. \tag{A.63}$$

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

$$\mathbb{E}[R_{E,i} \mid \sigma_{E,i}] = \frac{\mathbb{E}\left[p\left(\hat{\theta}_\tau^+, \hat{g}_{i,\tau}^+, q_{ii,\tau}^+, \tau^+\right) \middle| \sigma_{E,i}\right]}{\tilde{p}\left(\sigma_{E,i}; \hat{\theta}_\tau^-, \hat{g}_{i,\tau}^-, q_{ii,\tau}^-, \tau^-\right)}. \tag{A.64}$$

Macroeconomic Announcement (MA) beta Let T denote the macro announcement time. The MA gross return for equity i is

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

Conditioning on $\sigma_{E,i}$, the MA beta is

$$\beta_{M,i} | \sigma_{E,i} = \frac{\mathrm{Cov}\big(\, R_{M,i}, R_{M,M} | \, \sigma_{E,i}\big)}{\mathrm{Var}\big(\, R_{M,M} | \, \sigma_{E,i}\big)}.$$

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

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

The market mean is

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

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

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

where

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

The second moment of the market MA return is

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

As a result,

$$\beta_{M,i} \mid \sigma_{E,i} = \frac{\mathbb{E}[R_{M,i}R_{M,M} \mid \sigma_{E,i}] - \mathbb{E}[R_{M,i} \mid \sigma_{E,i}]\mathbb{E}[R_{M,M} \mid \sigma_{E,i}]}{\mathbb{E}[(R_{M,M})^2 \mid \sigma_{E,i}] - \left(\mathbb{E}[R_{M,M} \mid \sigma_{E,i}]\right)^2}. \tag{A.65}$$

At the MA, $\hat{\theta}_T^+ = \theta_T$ and $\text{Cov}(\hat{\theta}_T^+, \hat{g}_{i,T}^+) = -\alpha_i q_{\theta\theta}^+(\tau) < 0$. 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 α_i, this implies $\beta_{M,i}$ is reduced relative to the non-announcer benchmark---turning negative when the idiosyncratic hedge dominates the aggregate exposure--- and it falls further as EA precision increases (larger α_i, smaller $\sigma_{E,i}^2$). The expected MA return (conditional on $\sigma_{E,i}$) is

$$\mathbb{E}[R_{M,i} \mid \sigma_{E,i}] = \frac{\mathbb{E}\left[p\left(\hat{\theta}_T^+, \hat{g}_{i,T}^+, q_{ii,T}^+, T^+\right) \Big| \sigma_{E,i}\right]}{p\left(\hat{\theta}_T^-, \hat{g}_{i,T}^-, q_{ii,T}^-, T^-\right)}. \tag{A.66}$$

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 approximately 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 in line with literature standards. We filter quotes with abnormal condition codes, remove crossed quotes (bid exceeding offer with both 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 (2008). 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 twenty-five 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 intradaily returns per day. The choice of a twenty-five-minute interval follows Patton and Verardo (2012), who show that it optimally captures return comovement around earnings announcements, 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 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 price level and median annualized volatility, and discard observations where the price deviates from the yearly median by more than ten times the annualized standard deviation. 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 panel A 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 10 bps, whereas on non-announcement days, the average return is 5 bps; this announcement premium is consistent with that documented in Savor and Wilson (2016).

Macroeconomic Announcement Days We consider the releases of major U.S. macroeconomic indicators: 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; FOMC meets eight times per year.[1] Data on these announcements is from the websites of the entities that released them. Except for ISM, all other economic indicators are public indices 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 announcement. Table B.1 Panel B summarizes average excess returns on macroeconomic announcement versus non-macroeconomic announcement days. Across all macroeconomic announcement days in our sample, we observe 4,403,988 firm-day observations. The equal-weighted daily excess return on macroeconomic announcement days is approximately 19 bps, consistent with Savor and Wilson (2013) and Ai and Bansal (2018) documenting sizable risk premia around macroeconomic news releases. By contrast, on days without earnings or macroeconomic announcements, the average excess return is roughly 2.5 bps.

Consensus Macroeconomic Forecasts We measure macroeconomic surprises from three sources. For GDP and unemployment, we use consensus forecasts from the Blue Chip Economic Indicators (BCEI) survey; the forecast error is the realized value minus the consensus

[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, we exclude these releases from the analysis.

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

	N (firm-days)	Mean (bps)	t-stat	Median
Panel A — Returns on Expected EA vs. Non-EA Days				
Expected EA	232,641	11.18	(3.23)	11.22
non-EA	26,920,786	6.08	(4.34)	14.25
non-EA& non-MA	20,141,752	3.73	(2.35)	11.24
Panel B — Returns on MA vs. Non-MA Days				
MA	4,403,988	19.90	(5.41)	29.28
non-MA	22,899,526	3.39	(2.24)	11.35

Daily equal-weighted raw returns are reported in basis points as cross-sectional averages. Panel A 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, and compares them with firm-days not associated with an earnings announcement. The "non-EA & non-MA" category further excludes macroeconomic announcement days. Panel B reports analogous statistics for macroeconomic announcement (MA) dates (NFP, GDP, ISM, and FOMC) and compares them with non-MA 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.

forecast, divided by forecast dispersion. For 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; in particular, unemployment errors are multiplied by -1. FOMC surprises are measured using high-frequency monetary policy shocks following Bauer and Swanson (2023). We exclude extreme GDP and unemployment 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 mean zero and unit standard deviation. When multiple announcements fall on the same day and their surprises agree in sign, we retain one surprise using a priority rule, with FOMC given priority; days with conflicting signs are dropped.

Individual Firm Earnings Forecasts We measure firm-level belief revisions using I/B/E/S Detail (individual analyst forecasts) for annual earnings per share, focusing on the one-year-ahead forecast horizon, which provides the largest and most frequently updated set of forecasts in the data. For a given broker-analyst-firm triple, a belief revision is defined as the change in the analyst's forecast relative to that analyst's most recent prior forecast; the first observed forecast for a given broker-analyst-firm is therefore not treated as a revision. The dependent variable in our belief-revision regressions is the raw forecast revision (change in EPS forecast in dollars), 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. Revisions that are stale, defined as forecasts unchanged from the prior forecast for more than 180 days, are excluded. The resulting panel contains 1,646,388 firm-day observations, of which 272,278 correspond to firms with an earnings announcement within the prior earnings-announcement window.

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 19292024. The market return and its volatility are computed from the monthly CRSP value-weighted return, annualized; the real risk-free rate is the FamaFrench rate minus realized CPI inflation. Dividend growth is constructed from CRSP value-weighted returns with and without dividends following the GoyalWelch method, 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 above $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 between-firm variance of firms' average growth minus the average within-firm sampling variance, which removes the estimation-noise floor. All firm-level moments have model counterparts computed identically on simulated data.

B.2 Additional Empirical Tests

B.2.1 Excess Beta and Returns

On both earnings announcement days and macroeconomic announcement days, returns are driven in large part by standard CAPM beta. To isolate the belief-revision channel proposed in our model, we decompose intraday returns into a standard CAPM 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.2 shows that on earnings announcement days, a one-standard-deviation increase in β^{EA} is associated with approximately 0.30 basis points higher daily excess returns, corresponding to an annualized magnitude of 76 basis points. Column (2) shows that on macroeconomic announcement days, a one-standard-deviation increase in β^{MA} is associated with approximately 0.31 basis points higher daily excess returns, corresponding to 77 basis points per year.

Because β^{EA} and β^{MA} are standardized to have mean zero and unit variance, the coefficients are directly comparable. The magnitude of risk pricing on macroeconomic announcement days is quantitatively similar to that on earnings announcement days, suggesting that the market prices this information risk consistently across events.

Table B.2: Excess Returns and Announcement-Specific Risk

	(1) EA-day Exret	(2) MA-day Exret
β (standardized)	0.350	0.371
	(3.34)	(12.57)
N	241,168	3,298,766
R^2	0.115	0.167
Firm and Time 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}. The beta measure is defined as the component of a firm's announcement-day beta in excess of its unconditional CAPM beta, computed as in Equation (26). 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. Financial firms (SIC 6000–6999) are excluded. 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.2.2 Earnings Informativeness through Time

We further test whether the strength of the repricing channel on macroeconomic announcement days varies with the recency of the prior earnings announcement. As time passes, the information about aggregate conditions embedded in an earnings signal $(g + \theta)$ 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 distant announcers than for recent ones. This implies a weaker reversal and a less negative β^{MA} for firms with stale earnings news.

To test this prediction, we regress β^{MA} on β^{EA} on macroeconomic announcement days. All variables 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 earnings informativeness. 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.3: Reversion of β^{MA} on Macroeconomic Announcement Days

	(1) All EAs	(2) EA < 1 week	(3) EA 1 week–1 month
β^{EA} (standardized)	-0.141	-0.317	-0.081
	(-27.69)	(-44.92)	(-21.22)
N	975,083	256,167	718,273
R^2	0.054	0.126	0.053
Firm and Time FE	✓	✓	✓

This table reports regressions of β^{MA} on the standardized β^{EA}. The beta measures are defined as the component of a firm's announcement-day beta in excess of its unconditional CAPM beta, computed as in Equation (26). 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 prior. 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. Market equity is required to be at least \$10 million. Betas are truncated at 0.5/99.5%.

Table B.3 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 recency reveals a clear gradient: the relation is strongest when earnings were announced within the past week, with a coefficient of –0.317, and attenuates when the earnings announcement occurred between one week and one month earlier, with a coefficient of –0.081.

To assess the economic magnitude, we relate daily excess returns on macroeconomic announcement days to β^{MA} using the regression $exret_t = \alpha + \gamma\,\beta^{\mathrm{MA}} + \varepsilon_t$. The estimated slope coefficient γ is 11.8 basis points 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 basis points in daily excess returns (11.8×1.86). Combining this estimate with the coefficients above implies that a one-standard-deviation increase in prior earnings informativeness (β^{EA}) corresponds to an implied decline of approximately 7 basis points in daily excess returns on macroeconomic announcement days.

B.2.3 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 a different 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 co-movement 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 the Jarociński and Karadi (2020) classification identifies cash-flow news, and zero otherwise.

Table B.4 reports the results. Panel A shows the average matched-portfolio long-short return (non-announcers minus announcers) on FOMC days, split by news type. On all 205 FOMC days in our sample, the equal-weighted long-short spread is -5 bps ($t = -2.51$) and the value-weighted spread is -11 bps ($t = -2.72$). Restricting to discount-rate-only days ($N = 129$) yields spreads of -6 and -10 bps; restricting to cash-flow news days ($N = 76$) yields -4 and -11 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 attenuation on discount-rate-only days, and the slope measures any differential effect on cash-flow news days. The interaction coefficient is statistically zero for both equal-weighted

($\beta = 1.6$, $t = 0.35$) and value-weighted ($\beta = -1.1$, $t = -0.13$) returns. The repricing premium does not differ across FOMC news types. This is consistent with the model, in which discount-rate movements on announcement days themselves reflect news about the aggregate state.

Table B.4: 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	(−2.51)	−11	(−2.72)
Discount-rate only ($N = 129$)	−6	(−2.16)	−10	(−1.99)
Cash-Flow news ($N = 76$)	−4	(−1.29)	−11	(−1.89)
Panel B: Interaction Regression on All FOMC Days				
α (discount-rate baseline)	−5.9	(−2.20)	−10.2	(−2.07)
β (cash-flow − discount)	1.6	(0.35)	−1.1	(−0.13)

Panel A reports average matched-portfolio long-short returns (non-announcers minus 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 $CBI_{pm} \neq 0$ 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 size and industry). t-statistics in parentheses.

B.2.4 Belief Revision: Consensus Surprise Measure

As a robustness check, we re-estimate the belief-revision specification by replacing the market's announcement-day return with standardized consensus macroeconomic forecast errors. We estimate

$$\text{Rev}_{i,t} = \beta_1 \text{Surprise}_t + \beta_2 (\text{EA}_{i,t} \times \text{Surprise}_t) + \beta_3 \text{EA}_{i,t} + \alpha_i + \delta_k + \varepsilon_{i,t}, \qquad \text{(B.1)}$$

where $\text{Rev}_{i,t}$ is the analyst EPS forecast revision, Surprise_t is the standardized macroeconomic surprise, $\text{EA}_{i,t} = 1$ if the firm had a recent earnings announcement, and α_i are firm fixed effects, and δ_k are event-type fixed effects. On non-macroeconomic-announcement days, the surprise is set to zero. Days on which multiple announcements have surprises with conflicting signs are dropped. Because multi-announcement days can be handled using different priority rules for selecting which surprise to retain, we report three specifications.

Table B.5 reports the results. The interaction coefficient β_2 is negative and statistically significant across all three treatments of overlapping announcements ($t \approx -2.1$, $p \approx 0.035$):

Table B.5: Belief Revision: Consensus Surprise Measure

	(1)	(2)	(3)
Surprise (β_1)	−0.0027	−0.0025	−0.0018
	(−0.87)	(−0.81)	(−0.57)
Surprise × EA (β_2)	−0.0090	−0.0091	−0.0094
	(−2.11)	(−2.12)	(−2.16)
EA (β_3)	0.0426	0.0426	0.0425
	(16.69)	(16.69)	(16.67)
N	1,616,312	1,616,312	1,616,312
R^2	0.083	0.083	0.083
Firm FE	✓	✓	✓
Event-type FE	✓	✓	✓
Cluster (firm, date)	✓	✓	✓

This table reports estimates of Equation (B.1). The dependent variable is the winsorized analyst EPS forecast revision. Columns differ in how multi-announcement days are handled: column (1) keeps FOMC > ISM > NFP > UNEMP > GDP; (2) keeps FOMC > NFP > UNEMP > ISM > GDP; (3) averages all same-day standardized surprises. Macroeconomic surprises are standardized consensus forecast errors for NFP, ISM, GDP, and unemployment announcements, and monetary policy shocks for FOMC announcements Bauer and Swanson (2023). 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. Days on which multiple announcements have surprises with conflicting signs are dropped. We exclude extreme GDP and unemployment outliers from April to July 2020. t-statistics based on date-clustered standard errors are in parentheses.

positive macroeconomic surprises lead to downward revisions in firm-specific growth expectations for recent announcers, and vice versa. This result is stable across priority rules for multi-announcement days. The baseline sensitivity of revisions to macroeconomic news, β_1, is small and statistically insignificant, confirming the pattern documented in Table 7.

B.2.5 Analyst Forecast Revisions around Macroeconomic Announcements

If macroeconomic announcements prompt investors to reassess firm-specific information revealed in recent earnings releases, belief revision activity should intensify on macroeconomic announcement days. We show that analysts' forecast revisions cluster on these days, that this activity is strongest for firms with very recent earnings announcements, and that it attenuates as earnings information becomes more distant.

In a first test, we perform a time-series analysis of forecast revisions around macroeconomic announcement days. Results are displayed in Table B.6. For each calendar day in our sample, we construct three measures of analyst belief revision activity: (i) the average number of forecast revisions per 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 day before (MA-1) and the day after (MA+1), controlling for day-of-week effects following DellaVigna and Pollet (2009). Robust standard errors are used throughout.

Table B.6 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.6: Belief Updates on Macroeconomic Announcement Days

	(1) Avg Revisions/Firm	(2) Total Revisions	(3) # Revised Firms
MA day	0.047	51.10	18.84
	(3.740)	(4.500)	(4.120)
MA+1 day	0.022	17.34	5.94
	(1.370)	(1.180)	(1.020)
MA−1 day	0.011	21.65	8.26
	(0.870)	(1.810)	(1.610)
Constant	1.304	322.3	236.3
	(241.1)	(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 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 an analyst-forecast-level probit model in which the dependent variable equals one if an 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 indicators for macroeconomic announcement days and earnings announcement days, as well as controls for the timing of the most recent earnings announcement. The estimation sample contains approximately 25 million analyst-forecast observations. As reported in Table B.7, 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.7: 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	(153.8)	0.01	(144.6)
EA within 0-1 days	1.52	(930.1)	0.35	(589.1)
EA within 2-5 days	0.46	(242.8)	0.06	(184.8)
EA within 6-10 days	0.00	(-0.240)	0.00	(-0.240)
EA within 11-50 days	-0.19	(-182.2)	-0.02	(-186.8)
Constant	-1.78	(-2462)	—	—
Observations	25,651,008		25,651,008	
Pseudo R^2	0.1104			

This table reports probit regressions in which the dependent variable equals one if at least one analyst revises its 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 1.5 percentage points, 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 reflects 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 announcements themselves induce additional belief updating consistent with the repricing channel emphasized in the model.

Appendix C: Numerical Solutions

C.1 Solve for H function

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

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

Use the finite difference method and approximate the functions $H\left(\hat{\theta}_t, t\right)$ at I discrete points in the space dimensions, $\hat{\theta}_i,\ i=1,2,...,I$. Denote $H_i^n = H\left(\hat{\theta}_i, t^n\right)$, where time dimension $n = 0,1,2,...,N$. Denote

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

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

Use the implicit method to update the value function,

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

Use the 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,

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

where

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

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

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

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

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

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

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

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 $H_0 = H_1$ and $H_{I+1} = H_I$. Substituting into the finite difference equation at $i = 1$ and $i = I$, the diagonal entries at the boundaries become

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

so that the points outside the grid are absorbed into the diagonal. This ensures that every row of $\mathbf{A}$ 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 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 posterior $q_{\theta\theta}^+(\tau)$ is $q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)}{1+q_{\theta\theta}^-(\tau)\, s_\Sigma}$, $s_\Sigma \equiv \sum_{i=1}^N v_i$, $v_i \equiv \frac{1}{q_{ii}^-(\tau)+\sigma_{E,i}^2}$. (If only a subset announces at τ, the sum runs over that subset.) Hence the one-dimensional variance inside the EA integral is: $q_{\theta\theta}^-(\tau) - q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)^2 s_\Sigma}{1+q_{\theta\theta}^-(\tau) s_\Sigma}$.

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 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, H does not depend on the realization of $\sigma_{E,i}$, therefore it is the same across all firms.

C.2 Solve for price-to-dividend ratio

By Lemma 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.48').

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

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

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 $q_0^{(k)}$,

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

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,

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

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

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

The same adjustment is applied in the $\hat{g}$ direction: at $j = 1$, the edge coefficient $\chi_{i,1}$ (which would point to the nonexistent $j = 0$ block) is absorbed into the center diagonal; at $j = J$, the edge coefficient $\lambda_{i,J}$ (which would point to $j = J+1$) is absorbed into the center diagonal. After these adjustments every row of $\mathbf{A}$ sums to zero.

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

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

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

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

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

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

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

$$(\mathbf{B}_g)_{j,j-1} = \mathrm{diag}(\chi_{1,j}, \ldots, \chi_{I,j}), \qquad (\mathbf{B}_g)_{j,j+1} = \mathrm{diag}(\lambda_{1,j}, \ldots, \lambda_{I,j}),$$

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.

Define the Kalman gain for firm i at the earnings announcement:

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

EA boundary. At the earnings announcement, $\tau^+ = T^-$ lies within the same announcement cycle, so the q_0 label is unchanged. The EA shifts q_{ii} from $q_{ii}^-(\tau)$ to $q_{ii}^+(\tau)$, but that jump is already encoded in the deterministic path $q_{ii}(t; q_0)$ at τ^+. 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 $\sigma_{E,i}$ through α_i. The $\Delta\Sigma_{M,i}$ matrix (derived below) has rank one, so $\hat{g}_i^+(T) = \hat{g}_i^-(T) - \alpha_i(\hat{\theta}_T^+ - \hat{\theta}_T^-)$ 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 $q_0' = (1-\alpha_i)\, q_{ii}^-(\tau; q_0)$ 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 $\sigma_{E,i}$ through α_i, so different firm types map to different q_0' values.

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

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

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

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

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, $q_{\theta\theta}^+(\tau) = \dfrac{q_{\theta\theta}^-(\tau)}{1 + q_{\theta\theta}^-(\tau) s_\Sigma}$, $\alpha_i = \frac{q_{ii}^-(\tau)}{q_{ii}^-(\tau) + \sigma_{E,i}^2}$, $s_\Sigma = \sum_{j=1}^N \frac{1}{q_{jj}^-(\tau) + \sigma_{E,j}^2}$. 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

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

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

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

$\hat{g}_i^+(T)$ is zero:

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

Hence the joint Gaussian integral over $(\hat{\theta}^+, \hat{g}_i^+)$, i.e., $\int\int(.)\phi(.)$ 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 is i.i.d. across announcing firms with a discrete support $\{\sigma_{E,n}\}_{n=1}^N$ and probabilities $\{prob_n\}_{n=1}^N$ (e.g., a uniform distribution with each $\sigma_{E,i}$ having probability $1/N$). 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 $\tilde{p}$.

We compute the boundary condition in two steps.

- Step 1. Condition on a realization of σ_E.

  We draw the i.i.d. random variable σ_E. Investors know the distribution of σ_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 $\sigma_{E,i} \in \sigma_E$. It is useful to denote this intermediate step as:

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

- 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 value function based on the information set $\left\{\hat{\theta}_\tau^-, \hat{g}_\tau^-, \tau^-; q_0\right\}$ right before the announcement. This gives

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

Similarly, after earnings announcement(s) at τ With N firms announcing at τ, let

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

The common-factor posterior is $q_{\theta\theta}^+(\tau) = \frac{q_{\theta\theta}^-(\tau)}{1+q_{\theta\theta}^-(\tau)\, s_\Sigma}$. Define the event-time variance drop at τ for (θ, g_i): $\begin{pmatrix} \hat{\theta}^+(\tau) \\ \hat{g}_i^+(\tau) \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} \hat{\theta}^-(\tau) \\ \hat{g}_i^-(\tau) \end{pmatrix}, \Delta\Sigma_{E,i} \right)$. Using the N-firm EA identities (with $q_{\theta g_i}^-(\tau) = 0$ on the interior),

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

Or equivalently,

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

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

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

Rank / singularity issue:

- If only firm i announces (the one-firm case), then $s_\Sigma = v_i$ and $\Delta\Sigma_{E,i}$ is rank-1 (singular).
- If two or more firms announce ($N \geq 2$), then $s_\Sigma > v_i$ 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.

$$\tilde{p}\left(\sigma_{E,i};\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,\tau^-;q_0\right)=\mathbb{E}\left[\frac{H\left(\hat{\theta}_\tau^+,\tau^+\right)^B p\left(\hat{\theta}_\tau^+,\hat{g}_{i,\tau}^+,\tau^+;q_0\right)}{\left(\mathbb{E}\left[H\left(\hat{\theta}_\tau^+,\tau^+\right)\mid\hat{\theta}_\tau^-,\tau^-\right]\right)^B}\middle|\sigma_{E,i},\hat{\theta}_\tau^-,\hat{g}_\tau^-,\tau^-;q_0\right]$$

$$=\frac{\iint H\left(\hat{\theta}_\tau^+,\tau^+\right)^B p\left(\hat{\theta}_\tau^+,\hat{g}_{i,\tau}^+,\tau^+;q_0\right)\phi\left(\hat{\theta}_\tau^+,\hat{g}_{i,\tau}^+\middle|\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,\Delta\Sigma_{E,i}\right)d\hat{\theta}_\tau^+ d\hat{g}_{i,\tau}^+}{\left[\int_{-\infty}^{+\infty}H\left(\hat{\theta}_\tau^+,\tau^+\right)\phi_1\left(\hat{\theta}_\tau^+\middle|\hat{\theta}_\tau^-,\Delta q_{\theta\theta}(\tau)\right)d\hat{\theta}_\tau^+\right]^B}$$

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

$$p\left(\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,\tau^-;q_0\right)=\mathbb{E}\left[\tilde{p}\left(\sigma_{E,i};\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,\tau^-;q_0\right)\middle|\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,\tau^-;q_0\right]$$

$$=\sum_{n=1}^{N}prob_n\tilde{p}\left(\sigma_{E,n};\hat{\theta}_\tau^-,\hat{g}_{i,\tau}^-,\tau^-;q_0\right).$$

C.3 History Dependence of s_Σ

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

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

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 $s_\Sigma(\tau)$ is cohort- and history-specific. Substituting this realized s_Σ 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 introduce a stationary, permutation-invariant cohort aggregator. We retain full cross-sectional heterogeneity in the firm-level problem (for the price-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 release announcements that contain no information; (ii) the cohort uses the same multiset of EA noise variances $F_E = \{\sigma_{E,1}, \ldots, \sigma_{E,N}\}$, with one draw of each precision assigned to firms by a 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. i.e., $\Delta = \tau - T^+$. 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-EA idiosyncratic variance at T^+ is given by (from Equation (A.15)):

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

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 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 s_Σ, since $v_i \to 0$ as $\sigma_{E,i}^2 \to \infty$. 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 $\{\sigma_{E,1}^2, \sigma_{E,2}^2\}$ 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 $\Phi_\Delta(g(\mu_1^{k-1}, \sigma_{E,1}))$ 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

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

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 pre-EA variance *mean* is time-invariant. This fixed point therefore delivers a well-defined, permutation-invariant cohort aggregator $\bar{s}_\Sigma$.