

Noise Traders in a Production Economy Model

Christos I. Giannikos *

Andreas Kakolyris †

Georgios Koimisis ‡

January 25, 2026

Abstract

We modify the traditional noise-trader model by incorporating a firm within a production economy. In our framework, the firm exploits mispricing in equity markets: when stock prices are high it issues shares, and when they are low it repurchases, thereby endogenizing equity supply and stabilizing prices. This mechanism yields a simple decomposition: belief shocks drive fluctuations in mispricing, while average mispricing is lower when firms issue on net. We also study capital-structure implications. Departing from the Modigliani–Miller approach, with noise traders the firm chooses an interior equity issuance policy, so optimal capital structure is determined in equilibrium. Simulations that vary the prevalence of noise traders and fundamental risk confirm these predictions: the production economy exhibits smaller average deviations from fundamentals than an exchange benchmark, and the gap widens as noise trading or risk increases.

Keywords: noise trading; asset pricing; market efficiency; production economy; capital structure; behavioral finance

JEL classification: D21, D51, G12, G32, G41.

*Zicklin School of Business, Baruch College; Email: Christos.Giannikos@baruch.cuny.edu

†College of Business and Public Management, Kean University; Email: akakolyr@kean.edu

‡O' Malley School of Business, Manhattan University; Email: gkoimisis02@manhattan.edu

1 Introduction

This paper develops a tractable production economy model with a profit-maximizing firm, rational investors, and noise traders. The firm issues equity at high valuations and repurchases at low ones, making equity supply endogenous; supply feeds back into prices and yields an optimal interior capital structure. The framework connects to investment-based asset pricing (Cochrane, 1991; Gomes et al., 2003; Zhang, 2005) and to research showing that prices influence corporate policies and real decisions (Baker et al., 2003). It also aligns with evidence that issuance and repurchases co-move with valuations and subsequent returns (Pontiff and Woodgate, 2008; Peyer and Vermaelen, 2009), highlighting a corporate-supply channel alongside the Modigliani–Miller benchmark.

Our starting point is the classic noise-trader model of De Long et al. (1990), henceforth DSSW, which formalizes how non-fundamental demand can move prices away from fundamental value in an exchange economy. Earlier research investigates belief shocks and their implications for volume, volatility, and transitory mispricing (Barberis et al., 1998; Stambaugh et al., 2012) and why mispricing can persist under limits to arbitrage (Black, 1986; Shleifer and Vishny, 1997). More recent work shows how belief shocks shape trading activity and temporary price deviations (Peress and Schmidt, 2020), how social-media amplification can catalyze attention and volatility (Keasey et al., 2025), and how the security market line can flip with sentiment as unsophisticated capital chases high-beta stocks (Antoniou et al., 2016). Complementary evidence links systematic, non-fundamental flows to priced “noise trader risk” at the factor level (Huang et al., 2024) and documents derivatives-based mispricing consistent with noisier domestic participation (Ryu and Yang, 2020).

What remains largely absent from variants of the DSSW framework is a tractable production economy model in which an optimizing issuer adjusts equity supply in response to belief shocks, with this feedback jointly determining prices and capital structure (Xu, 2023). We fill this gap by embedding belief shocks into a production economy with a profit-maximizing firm that adjusts equity supply by issuing shares when prices are high and repurchasing when low. This endogeneity feeds back into price formation. The mechanism complements stock-market feedback results where capital structure raises price informativeness (Machado and Pereira, 2022), agency views where career concerns can generate non-informational trading pressure (Trueman, 1988), and settings where imperfect competition magnifies the noise impact in small markets (Palomino, 1996).

Our contributions can be summarized as follows: (i) We derive a closed-form relation in which the firm’s own issuance/repurchase enters the risk discount, implying that belief shocks drive time-series mispricing while average mispricing declines when net issuance is positive. (ii) With noise traders, the firm chooses an interior equity-issuance and leverage policy, violating Modigliani–Miller irrelevance even without taxes, distress costs, or asymmetric information—providing a frictionless benchmark in which belief-driven demand pins financing choices. (iii) Relative to an exchange benchmark, the production economy exhibits smaller average deviations from fundamentals, with the gap widening as the prevalence of noise traders or fundamental risk increases; greater supply elasticity disciplines prices. These results contribute to the asset-pricing efficiency and capital-structure literatures and yield testable predictions linking issuance/repurchases, sentiment, risk, and mispricing through the elasticity of corporate equity supply and time-varying valuation risk.

This paper proceeds as follows. Section 2 introduces the model, derives pricing under endogenous equity supply, and characterizes the mispricing and the firm’s interior capital-structure choice. Section 3 presents models’ comparative statics and simulations, relative to a pure exchange benchmark. Section 4 concludes.

2 Theoretical Model

2.1 Assumptions

Following DSSW, we use an overlapping-generations model with two-period-lived investors, classified as noise (irrational) and smart (rational), each type summarized by a representative agent. Noise traders price bonds correctly but misperceive tomorrow’s stock cumulative dividend price by an i.i.d. shock. Each investor earns exogenous labor income w_t in the first period and invests all of it; in the second period, they liquidate all positions and consume the proceeds, leaving no bequests. Consumption each period is the numeraire.

A young investor allocates wealth between two assets. The first is a safe bond, available in infinitely elastic supply, priced at one, and paying a fixed coupon r . The second is a risky stock: each unit conveys ownership of one unit of productive physical capital, sells at price p_t , and pays a risky dividend d_t . The firm issues or repurchases bonds and equity to maximize equity (shareholder) value.

The extent of noise-trader misperception in period t is unknown to all agents until that period but

becomes publicly observed once realized. Consequently, neither noise traders nor rational investors know in advance how distorted future beliefs will be, nor the resulting stock demand and equilibrium price. Because all investors must liquidate their holdings when old, this uncertainty about future misperceptions is a primary source of risk in the model.

2.2 Consumer's Problem

At date t , a young agent observes income w_t and chooses stock s_t and bond b_t holdings. The risk-free bond pays a gross return $R \equiv 1 + r$, and equity delivers the next-period cumulative payoff

$$X_{t+1} \equiv p_{t+1} + d_{t+1}. \quad (1)$$

Let $\mathcal{I}_t$ denote the information available at t , and write $E_t[\cdot]$ and $\text{Var}_t(\cdot)$ for expectation and variance conditional on $\mathcal{I}_t$. The budget constraint at t is

$$w_t = p_t s_t + b_t, \quad (2)$$

while terminal wealth at $t + 1$ is

$$W_{t+1} = s_t X_{t+1} + R b_t. \quad (3)$$

Eliminating $b_t = w_t - p_t s_t$ yields

$$W_{t+1} = s_t (X_{t+1} - R p_t) + R w_t. \quad (4)$$

CARA utility. Preferences are exponential with constant absolute risk aversion $A > 0$, and payoffs are (conditionally) normal. The problem therefore reduces to a mean-variance trade-off:

$$\max_{s_t} E_t[W_{t+1}] - \frac{A}{2} \text{Var}_t(W_{t+1}). \quad (5)$$

Using (4),

$$E_t[W_{t+1}] = s_t(E_t[X_{t+1}] - Rp_t) + R w_t, \quad (6)$$

$$\text{Var}_t(W_{t+1}) = s_t^2 V_t, \quad (7)$$

where $V_t \equiv \text{Var}_t(X_{t+1})$. Hence,

$$\max_{s_t} s_t(E_t[X_{t+1}] - Rp_t) + R w_t - \frac{A}{2} s_t^2 V_t. \quad (8)$$

The first-order condition is

$$(E_t[X_{t+1}] - Rp_t) - A V_t s_t = 0, \quad (9)$$

with a strictly concave objective ensuring the second-order condition holds. The optimal stock demand is therefore

$$s_t^* = \frac{E_t[X_{t+1}] - Rp_t}{A V_t}. \quad (10)$$

Given s_t^* , the bond position follows from the budget constraint:

$$b_t^* = w_t - p_t s_t^*. \quad (11)$$

Rational vs. noise traders. To distinguish beliefs, let $E_t^S[\cdot]$ denote rational (smart) expectations and $E_t^N[\cdot]$ noise-trader expectations. Rational investors hold correct beliefs about both mean and variance, so that

$$s_t^S = \frac{E_t^S[X_{t+1}] - Rp_t}{A V_t}. \quad (12)$$

Noise traders misperceive the *mean* by an i.i.d. Normal shock

$$\varepsilon_t \sim \mathcal{N}(\mu_\varepsilon, \sigma_\varepsilon^2), \quad (13)$$

while perceiving variance correctly:

$$E_t^N[X_{t+1}] = E_t^S[X_{t+1}] + \varepsilon_t, \quad V_t = \text{Var}_t(X_{t+1}) \text{ for both types.} \quad (14)$$

The corresponding stock demand is

$$s_t^N = \frac{E_t^S[X_{t+1}] + \varepsilon_t - Rp_t}{AV_t}. \quad (15)$$

Beliefs and variance. Equation (14) emphasizes that the noise trader's perceived expectation equals the rational expectation plus a belief shock. Equivalently, in information-set notation,

$$E[X_{t+1} \mid \mathcal{I}_{t,n}] = E[X_{t+1} \mid \mathcal{I}_t] + \varepsilon_t. \quad (16)$$

By assumption, both types agree on the conditional variance,

$$\text{Var}(X_{t+1} \mid \mathcal{I}_t) = \text{Var}(X_{t+1} \mid \mathcal{I}_{t,n}) \equiv \sigma_X^2 = V_t. \quad (17)$$

Corollary. Unconditionally,

$$\mathbb{E}[E_t^N[X_{t+1}]] = E_t^S[X_{t+1}] + \mu_\varepsilon. \quad (18)$$

If $\mu_\varepsilon > 0$ (systematically bullish), the perceived expected payoff is higher on average.

Aggregate demand. Using (12) and (15), the noise trader's position equals the rational benchmark plus a random tilt:

$$s_t^N = s_t^S + \frac{\varepsilon_t}{AV_t}. \quad (19)$$

Let $\theta \in [0, 1]$ denote the fraction of noise traders. Total (per-capita) demand is then

$$S_t^d = (1 - \theta) s_t^S + \theta s_t^N = s_t^S + \frac{\theta \varepsilon_t}{AV_t}. \quad (20)$$

Since ε_t is random and unobserved at t , aggregate demand is stochastic; this is the source of noise-trader risk in equilibrium pricing and, in our setting, the firm's supply response.

2.3 Firm's Behavior

The firm is price-taking and chooses investment to maximize shareholder value, financing via equity and debt, and financial conditions feed back into the firm's real decisions.

Capital and technology. New capital goods are priced at p_k . In a single-good economy with the consumption good as numeraire, $p_k = 1$, so one unit of output can either be consumed or installed as capital. Let K_t denote the firm's capital at the beginning of period t and I_t gross investment chosen at t . With no depreciation and no adjustment costs,

$$K_{t+1} = K_t + I_t. \quad (21)$$

One unit of installed capital yields a stochastic operating profit π_{t+1}^k at $t+1$, assumed i.i.d. with mean μ_π and variance σ_π^2 . Hence, total operating profit is

$$\Pi_{t+1} = K_t \pi_{t+1}^k, \quad E[\Pi_{t+1}] = K_t \mu_\pi, \quad \text{Var}(\Pi_{t+1}) = K_t^2 \sigma_\pi^2, \quad (22)$$

which parallels the dividend process in De Long et al. (1990), but arises endogenously from the firm's capital stock.

Financing and balance sheet at issuance. Let S_t denote shares outstanding at the start of t and B_t the face value of one-period debt due at t . The firm chooses I_t and finances it by issuing equity and/or debt:

$$I_t = p_t \Delta S_t + \Delta B_t, \quad S_{t+1} = S_t + \Delta S_t, \quad B_{t+1} = B_t + \Delta B_t. \quad (23)$$

We impose no retained earnings: all residual cash flow at $t+1$ is distributed to shareholders.

Cash flows and equity payout. At $t+1$ the firm realizes operating profit Π_{t+1} and repays bondholders RB_t with $R \equiv 1 + r$. With zero retention, total dividends are

$$D_{t+1} = \Pi_{t+1} - RB_t, \quad d_{t+1} \equiv \frac{D_{t+1}}{S_{t+1}} = \frac{\Pi_{t+1} - RB_t}{S_{t+1}}. \quad (24)$$

Thus, the cumulative payoff on a share held from t to $t+1$ is

$$X_{t+1} \equiv p_{t+1} + d_{t+1} = p_{t+1} + \frac{\Pi_{t+1} - RB_t}{S_{t+1}}. \quad (25)$$

Because new equity and debt are issued pro rata to current shareholders, there is no instantaneous

dilution in value at issuance. The per-share payoff at $t+1$ depends only on the next-period stock price p_{t+1} , realized profit Π_{t+1} , and the financing obligation RB_t spread over the end-of-period share count S_{t+1} . Issuance proceeds $p_t \Delta S_t$ and new borrowing ΔB_t finance I_t contemporaneously (cf. (23)) and do not appear in the $t+1$ payout (24)–(25).

Firm value. Given prices, the period- t market value of the firm is

$$V_t = p_t S_t + B_t, \quad (26)$$

and the firm chooses $(I_t, \Delta S_t, \Delta B_t)$ (equivalently, $K_{t+1}, S_{t+1}, B_{t+1}$ subject to (23)) to maximize shareholder value under (25) and the technology (21)–(22).

2.4 Market Equilibrium

Let s_t denote per-capita equity supply at date t . Market clearing requires aggregate per-capita demand to equal supply:

$$(1 - \theta) s_t^S + \theta s_t^N = s_t, \quad (27)$$

where, from the CARA rule in Section 3.2,

$$s_t^S = \frac{E_t^S[X_{t+1}] - R p_t}{A V_t}, \quad s_t^N = s_t^S + \frac{\varepsilon_t}{A V_t}, \quad V_t \equiv \text{Var}_t(X_{t+1}), \quad R \equiv 1 + r. \quad (28)$$

Substituting (28) into (27) and rearranging,

$$R p_t = E_t^S[X_{t+1}] + \theta \varepsilon_t - A V_t s_t, \quad \text{with } X_{t+1} \equiv p_{t+1} + d_{t+1}. \quad (29)$$

Variance decomposition. Noise traders misperceive only the mean. Thus both types agree on the payoff variance V_t , which we decompose as

$$V_t \equiv \text{Var}_t(X_{t+1}) = \sigma_\Pi^2 + (\theta R)^2 \sigma_\varepsilon^2, \quad (30)$$

capturing fundamental uncertainty (operating–profit risk σ_Π^2) and the risk induced by belief shocks $\varepsilon_t \sim \mathcal{N}(\mu_\varepsilon, \sigma_\varepsilon^2)$. The reduced–form volatility of next period’s price induced by belief shocks is

$$\text{Var}_t(p_{t+1}) = \left(\frac{\theta}{R}\right)^2 \sigma_\varepsilon^2. \quad (31)$$

Expected price and steady state. Taking expectations in (29) and using $E_t[\varepsilon_t] = \mu_\varepsilon$,

$$E_t[p_t] = \frac{1}{R} \left(E_t^S[X_{t+1}] + \theta \mu_\varepsilon - A V_t s_t \right). \quad (32)$$

In a stationary environment with $E_t^S[p_{t+1}] = E_t[p_t] \equiv p^*$, $E[d_{t+1}] = \mu_d$, $s_t = s^*$, and $V_t = V^*$, (29) implies

$$p^* = \frac{1}{r} \left(\mu_d + \theta \mu_\varepsilon - A V^* s^* \right), \quad V^* = \sigma_\Pi^2 + (\theta R)^2 \sigma_\varepsilon^2. \quad (33)$$

2.5 Model Implications

We compare our production economy to the DSSW exchange economy. Let p_t^0 denote the steady-state stock price in DSSW, and p_t the steady-state price in our model.

Steady-state prices. In DSSW we have fixed per-capita equity supply s_f (typically $s_f = 1$),

$$p_t^0 = \frac{\mu_d^f}{r} + \frac{\theta}{R} (\varepsilon_t - \mu_\varepsilon) + \frac{\theta}{r} \mu_\varepsilon - \frac{A}{r} \sigma_X^2 s_f, \quad \sigma_X^2 = \sigma_\Pi^2 + \left(\frac{\theta}{R}\right)^2 \sigma_\varepsilon^2. \quad (34)$$

In our production economy with endogenous equity supply s_t^* ,

$$p_t = \frac{\mu_d^*}{r} + \frac{\theta}{R} (\varepsilon_t - \mu_\varepsilon) + \frac{\theta}{r} \mu_\varepsilon - \frac{A}{r} \sigma_X^{*2}(s_t^*) s_t^*, \quad \sigma_X^{*2}(s_t^*) = \frac{\sigma_\Pi^2}{(s_t^*)^2} + \left(\frac{\theta}{R}\right)^2 \sigma_\varepsilon^2 \left(\frac{s_{t+1}^*}{s_t^*}\right)^2, \quad (35)$$

where μ_d^f is the mean per–share dividend in DSSW and $\mu_d^* = (\mu_\Pi^* - R b_t^*)/s_t^*$ is the mean per–share dividend in our economy. In both environments $R \equiv 1 + r$ and $\varepsilon_t \sim \mathcal{N}(\mu_\varepsilon, \sigma_\varepsilon^2)$. If share supply is locally constant so that $s_{t+1}^* = s_t^*$, then $\sigma_X^{*2}(s_t^*) = \sigma_\Pi^2/(s_t^*)^2 + (\theta/R)^2 \sigma_\varepsilon^2$.

Fundamental value and deviations. The fundamental price in each economy is the present value of

mean dividends, μ_d/r . Define the deviations from fundamentals as

$$D_f \equiv p_t^0 - \frac{\mu_d^f}{r}, \quad D_V \equiv p_t - \frac{\mu_d^*}{r}.$$

Subtracting (35) from (34) shows that belief terms cancel and only the risk-discount pieces remain:

$$D_f - D_V = \frac{A}{r} \left(\sigma_X^{*2} s_t^* - \sigma_X^2 s_f \right). \quad (36)$$

A useful special case sets $s_f = 1$ and compares at a common variance $\sigma_X^{*2} = \sigma_X^2$:

$$D_f - D_V = \frac{A}{r} \sigma_X^2 (s_t^* - 1). \quad (37)$$

Hence, if on average the firm issues equity ($s_t^* > 1$), deviations from fundamentals are smaller in the production economy ($D_V < D_f$): the firm stabilizes prices by endogenously adjusting supply. Note that under the reduced form

$$\text{Var}(p_t^0) = \text{Var}(p_t) = \left(\frac{\theta}{R} \right)^2 \sigma_\varepsilon^2,$$

so what matters for stabilization is relative volatility (because it shifts optimal supply), not the absolute variance of price.

Capital structure (endogenous equity supply). From market clearing and CARA–Normal demands,

$$E_t[p_t] = C - K s_t, \quad C \equiv \frac{1}{R} (E_t^S[X_{t+1}] + \theta \mu_\varepsilon), \quad K \equiv \frac{A}{R} \sigma_X^{*2}, \quad X_{t+1} \equiv p_{t+1} + d_{t+1}.$$

With pro-rata financing, maximizing $E_t[p_t] s_t = C s_t - K s_t^2$ yields an interior supply

$$s_t^* = \frac{C}{2K} = \frac{\frac{1}{R} (E_t^S[X_{t+1}] + \theta \mu_\varepsilon)}{\frac{2A}{R} (\sigma_\Pi^2 + (\theta/R)^2 \sigma_\varepsilon^2)}. \quad (38)$$

Comparative statics from (38):

$$\frac{\partial s_t^*}{\partial A} < 0, \quad \frac{\partial s_t^*}{\partial \sigma_\Pi^2} < 0, \quad \frac{\partial s_t^*}{\partial \sigma_\varepsilon^2} < 0, \quad \frac{\partial s_t^*}{\partial \mu_\varepsilon} > 0.$$

Steady-state price and value.

$$p^* = \frac{\mu_d^*}{r} + \frac{\theta}{r} \mu_\varepsilon - \frac{A}{r} \sigma_X^{*2} s^*, \quad \mathcal{V}^* = p^* s^* + b^* = \frac{\mu_\Pi^*}{r} - \frac{b^*}{r} + \frac{\theta}{r} \mu_\varepsilon s^* - \frac{A}{r} \sigma_X^{*2} (s^*)^2. \quad (39)$$

Debt b^* is determined from the financing identities and remains in value via the term $-b^*/r$.

3 Illustration

We calibrate the model to quantify the mechanisms highlighted by Eqs. (34)–(39). Table 1 reports the baseline parameterization. Each simulation runs for $T = 200$ periods. We set the risk-free rate to $r = 0.05$ (gross $R = 1.05$), a conventional value in corporate-finance calibrations (Morellec and Zhdanov, 2019). Absolute risk aversion is $A = 3$, standard in asset pricing. The noise-trader shock is Normal with $\mu_\varepsilon = 0$ and $\sigma_\varepsilon = 1$, for interpretability and in line with standardized sentiment (Baker and Wurgler, 2006). We vary the noise-trader fraction $\theta \in \{0.2, 0.3, 0.4, 0.5\}$. The DSSW mean dividend is $\mu_d^f = 0.6$, consistent with an average US dividend yield near 1.2% (Dai et al., 2023). Issuance responsiveness is set to $\phi = 0.15$.

The exchange benchmark is the standard DSSW model without corporate supply. In the production economy, to isolate the role of supply we use the simulation simplification $\mu_d^* = \mu_d^f/s^*$, so the fundamental price term is μ_d^*/r . We consider two profitability risk levels, $\sigma_\Pi \in \{0.25, 0.60\}$, representing low/high volatility regimes. Throughout, we adopt the same payoff variance for both economies,

$$\sigma_X^2 = \sigma_\Pi^2 + \left(\frac{\theta}{R}\right)^2 \sigma_\varepsilon^2,$$

as a simulation convention to hold demand-side risk fixed and cleanly identify the supply channel.¹ Equity supply is normalized to $s_f = 1$ in DSSW and set to $s^* = 1.2$ in production, aligning with the deviation comparison in Eqs. (36)–(37).

For magnitude, with $\sigma_\varepsilon = 1$ and a unit shock ($\varepsilon_t = 1$), the belief term equals

$$\frac{\theta}{R} \varepsilon_t \in \{0.190, 0.286, 0.381, 0.476\} \quad \text{for } \theta \in \{0.2, 0.3, 0.4, 0.5\},$$

so the one-period belief contribution is modest (roughly 1–4% of the $p = \mu_d/r$), while level differences

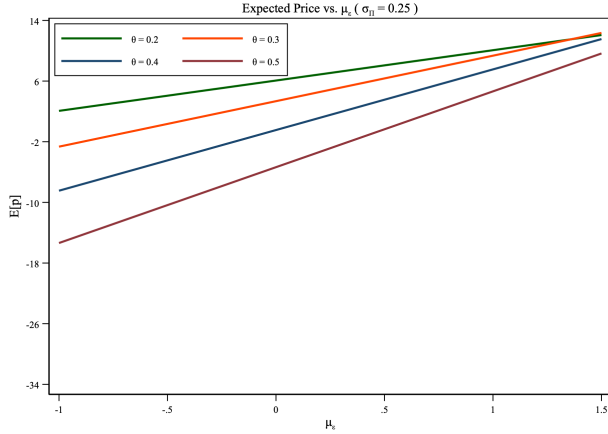
¹The production model's exact variance would scale with issuance; results are qualitatively unchanged.

across economies are governed by the risk-discount term scaled by supply.

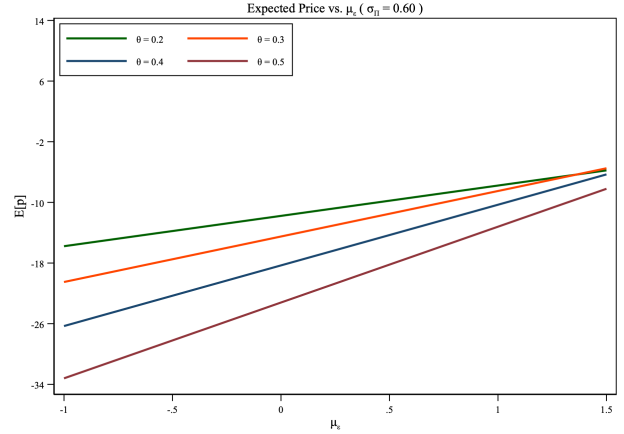
Table 1: Simulation parameters (DSSW vs. Production; time-varying issuance in Production)

Symbol	Description	Scenario 1 (Noise dominates)	Scenario 2 (Productivity dominates)
T	Simulation horizon (periods)		200
r, R	Net and gross risk-free rate	$r = 0.05, R = 1.05$	
A	Absolute risk aversion		3
μ_d^f	Mean per-share dividend (DSSW)		0.6
s_f	Per-capita equity supply (DSSW)		1
μ_ε	Mean of noise shock		0
σ_ε	Std. dev. of noise shock		1
θ	Fraction of noise traders	$\{0.2, 0.3, 0.4, 0.5\}$	
σ_Π	Std. dev. of operating-profit shock	0.25	0.60
σ_X^2	Payoff variance (both models, per θ)	$\sigma_X^2 = \sigma_\Pi^2 + (\frac{\theta}{R})^2 \sigma_\varepsilon^2$	
s_t^*	Equity supply (Production, time-varying)	$s_t^* = \bar{s} + \phi \varepsilon_t, \bar{s} = 1.2, \phi = 0.15, s_t^* \in [0.8, 1.6]$	
$\mu_d^*(t)$	Mean per-share dividend (Production, used in sims)	$\mu_d^*(t) \approx \mu_d^f / s_t^*$	
p_t^0	Price (DSSW)	$\frac{\mu_d^f}{r} + \frac{\theta}{R}(\varepsilon_t - \mu_\varepsilon) + \frac{\theta}{r}\mu_\varepsilon - \frac{A}{r}\sigma_X^2 s_f$	
p_t	Price (Production)	$\frac{\mu_d^*(t)}{r} + \frac{\theta}{R}(\varepsilon_t - \mu_\varepsilon) + \frac{\theta}{r}\mu_\varepsilon - \frac{A}{r}\sigma_X^2 s_t^*$	
D_f	Deviation from fundamentals (DSSW)	$D_f = p_t^0 - \frac{\mu_d^f}{r}$	
D_V	Deviation from fundamentals (Production)	$D_V = p_t - \frac{\mu_d^*(t)}{r}$	

Notes: Deviations are $D_{\text{DSSW}} = p_{\text{DSSW}} - \mu_d^f/r$ and $D_{\text{PROD}} = p_{\text{PROD}} - \mu_d^*(t)/r$ with $\mu_d^*(t) \approx \mu_d^f/s_t^*$. Payoff variance is $\sigma_X^2 = \sigma_\Pi^2 + (\theta/R)^2 \sigma_\varepsilon^2$. The greater dispersion of the Production series reflects time-varying issuance $s_t^* = \bar{s} + \phi \varepsilon_t$ (bounded in $[0.8, 1.6]$). Within each scenario, σ_X^2 depends on θ but is constant over time (we adopt the DSSW variance in both economies for simulations), while the production model's discount varies over time through s_t^* .



(a) $\sigma_\Pi = 0.25$



(b) $\sigma_\Pi = 0.60$

Figure 1: Steady-state expected price $E[p]$ as a function of noise-trader bullishness μ_ε for different values of θ . Panel (a) sets $\sigma_\Pi = 0.25$; Panel (b) sets $\sigma_\Pi = 0.60$.

Note: Lines plot $E[p] = \mu_d^*/r + (\theta/r)\mu_\varepsilon - (A/r)\sigma_X^2 s^*$ with $s^* = 1$ and $\sigma_X^2 = \sigma_\Pi^2 + (\theta/R)^2 \sigma_\varepsilon^2$. The slope in μ_ε is θ/r . Increasing θ raises demand via $(\theta/r)\mu_\varepsilon$ but lowers $E[p]$ through the risk discount, which grows in θ^2 . Comparing the two panels, higher fundamental risk σ_Π shifts all curves downward in parallel.

Figure 1 plots the steady-state expected price against noise-trader bullishness μ_ε , holding $s^* = 1$ so that Eq. (35) is illustrated directly:

$$E[p] = \frac{\mu_d^f}{r} + \frac{\theta}{r} \mu_\varepsilon - \frac{A}{r} \left(\sigma_\Pi^2 + \left(\frac{\theta}{R} \right)^2 \sigma_\varepsilon^2 \right),$$

with $\mu_d^* = \mu_d^f$. First, $E[p]$ increases in μ_ε with slope $\theta/r > 0$, steeper for larger θ . Second, at a fixed μ_ε , θ raises demand $(\theta/r)\mu_\varepsilon$ but also raises the risk discount $-(A/r)(\theta/R)^2\sigma_\varepsilon^2$, so lines in θ can cross. Third, higher fundamental risk shifts all curves down in parallel (moving from $\sigma_\Pi = 0.25$ to 0.60 reduces the intercept by $(A/r)\Delta\sigma_\Pi^2$) without changing the μ_ε slope.

Table 2: Summary statistics of deviations from fundamentals (DSSW vs. Production)

(a) Panel A — Scenario 1: Noise Dominates ($\sigma_\Pi = 0.25$)

θ	Model	Mean dev.	SD	CV
0.2	DSSW	-5.9307	0.1911	0.032
0.3	DSSW	-8.6543	0.2630	0.030
0.4	DSSW	-12.4317	0.4016	0.032
0.5	DSSW	-17.3130	0.4413	0.025
0.2	Production	-7.1069	0.6713	0.094
0.3	Production	-10.3589	0.9190	0.089
0.4	Production	-15.0548	1.5535	0.103
0.5	Production	-21.0143	1.9668	0.094

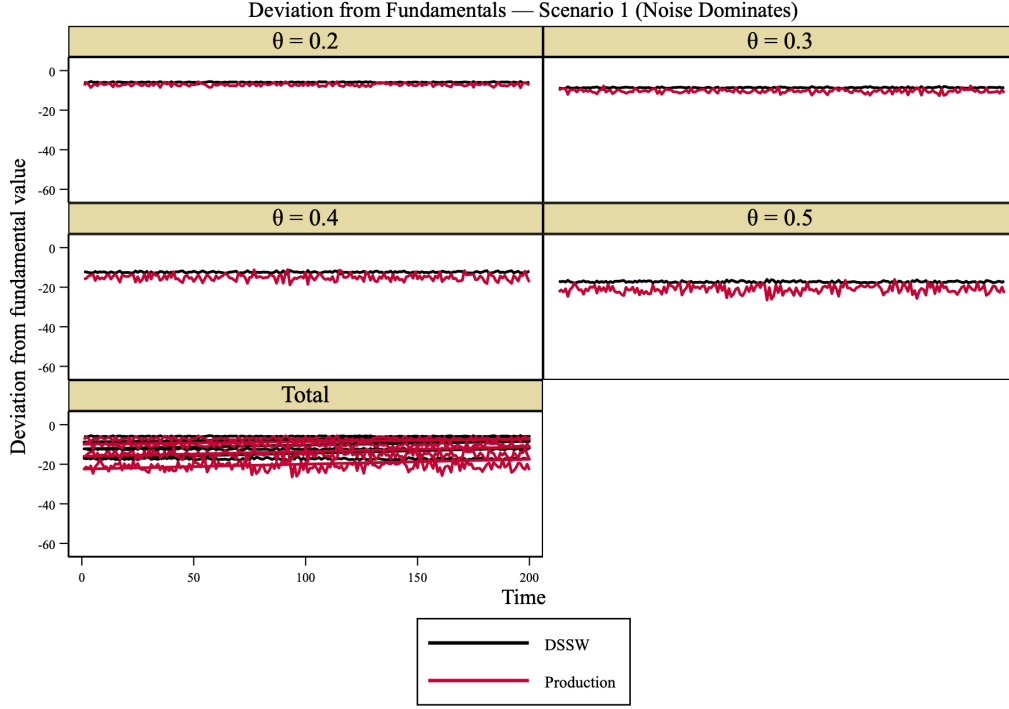
(b) Panel B — Scenario 2: Productivity Dominates ($\sigma_\Pi = 0.60$)

θ	Model	Mean dev.	SD	CV
0.2	DSSW	-23.7791	0.1814	0.008
0.3	DSSW	-26.5090	0.2952	0.011
0.4	DSSW	-30.3242	0.4070	0.013
0.5	DSSW	-35.1689	0.4671	0.013
0.2	Production	-28.4935	3.1972	0.112
0.3	Production	-31.6499	3.7568	0.119
0.4	Production	-36.1835	4.3253	0.120
0.5	Production	-42.6090	4.6639	0.109

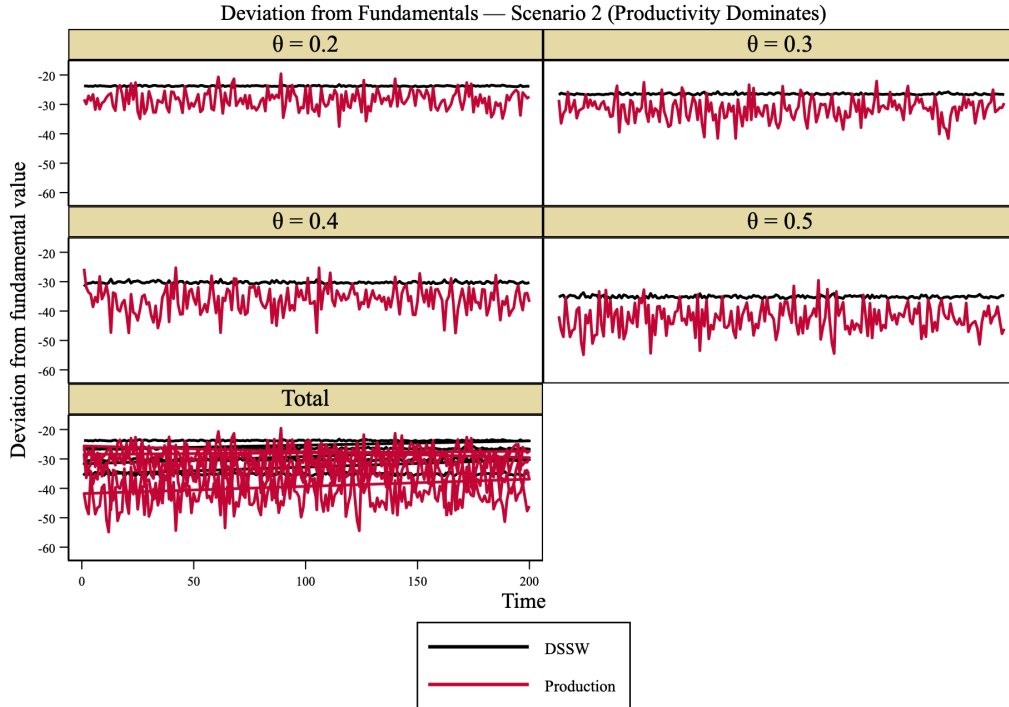
Notes: Deviations are $D_{\text{DSSW}} = p_{\text{DSSW}} - \mu_d^f/r$ and $D_{\text{PROD}} = p_{\text{PROD}} - \mu_d^*(t)/r$ with $\mu_d^*(t) \approx \mu_d^f/s_t^*$. Payoff variance is $\sigma_X^2 = \sigma_\Pi^2 + (\theta/R)^2\sigma_\varepsilon^2$. The greater dispersion of the Production series reflects time-varying issuance $s_t^* = \bar{s} + \phi\varepsilon_t$ (bounded in $[0.8, 1.6]$). The coefficient of variation (CV) is defined as $\text{CV} = \text{SD}/|\text{Mean deviation}|$.

Common parameters: $r = 0.05$, $R = 1.05$, $A = 3$, $\mu_d^f = 0.6$, $\bar{s} = 1.2$, $\phi = 0.15$, $\mu_\varepsilon = 0$, $\sigma_\varepsilon = 1$, $T = 200$, $\theta \in \{0.2, 0.3, 0.4, 0.5\}$. Scenario 1 sets $\sigma_\Pi = 0.25$; Scenario 2 sets $\sigma_\Pi = 0.60$.

Figure 2 plots deviations from fundamentals in the exchange economy (D_f) and production economy (D_V) for $\theta \in \{0.2, 0.3, 0.4, 0.5\}$ under two σ_Π levels. Within each scenario we keep σ_X^2 fixed over time,

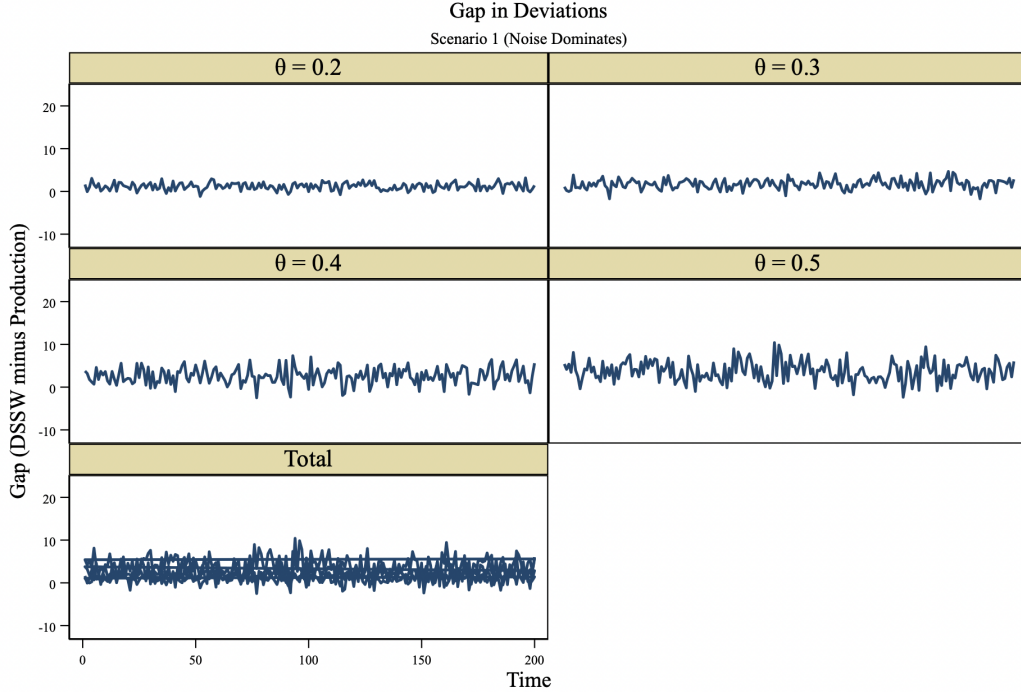


(a) Scenario 1: Noise dominates ($\sigma_{\Pi} = 0.25$).

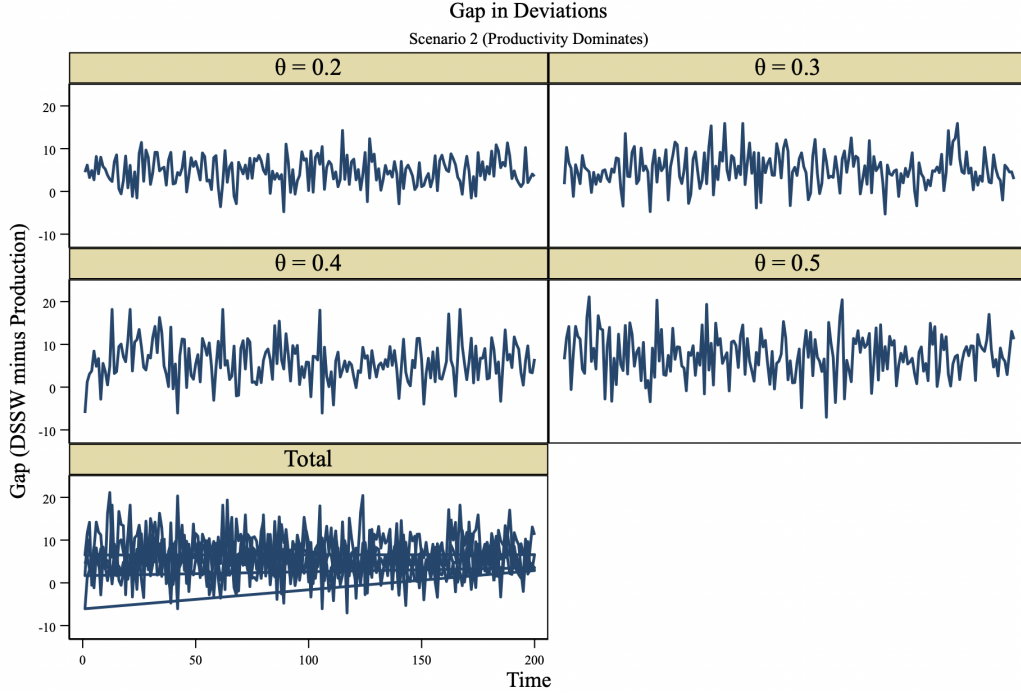


(b) Scenario 2: Productivity dominates ($\sigma_{\Pi} = 0.60$).

Figure 2: Deviation from fundamentals—DSSW vs. Production. Each panel plots the time series of deviations D_f (DSSW; black) and D_V (Production; blue) for $\theta \in \{0.2, 0.3, 0.4, 0.5\}$. In both panels, *Production* uses time-varying equity issuance $s_t^* = \bar{s} + \phi \varepsilon_t$ (clamped to $[0.8, 1.6]$), which makes D_V more dispersed than D_f . The payoff variance $\sigma_X^2 = \sigma_{\Pi}^2 + (\theta/R)^2 \sigma_{\varepsilon}^2$ is held constant within each scenario).



(a) Scenario 1: Noise dominates ($\sigma_{\Pi} = 0.25$).



(b) Scenario 2: Productivity dominates ($\sigma_{\Pi} = 0.60$).

Figure 3: Gap in deviations from fundamentals, $D_f - D_V$. Each panel plots $D_f - D_V$ for $\theta \in \{0.2, 0.3, 0.4, 0.5\}$, where $D_f = p_{\text{DSSW}} - \mu_d^f/r$ and $D_V = p_{\text{PROD}} - \mu_d^*(t)/r$. Because the belief terms cancel, the gap isolates the supply channel. Positive values (issuance, $s_t^* > 1$) indicate stronger risk discount in Production than in DSSW; negative values (repurchase, $s_t^* < 1$) indicate the opposite.

Magnitudes grow with θ and σ_{Π} .

and let issuance vary in production via $s_t^* = \bar{s} + \phi \varepsilon_t$ (clamped to $[0.8, 1.6]$). Two patterns emerge. (i) D_V is more volatile than D_f because the risk discount is multiplied by the state-dependent s_t^* and the fundamental term uses $\mu_d^*(t) \approx \mu_d^f/s_t^*$; the same ε_t thus moves prices directly (belief) and indirectly (issuance). (ii) When issuance is on net above 1 ($\bar{s} = 1.2$), the average discount is larger in production, so $E[D_V] < E[D_f]$. These patterns strengthen when σ_Π is higher.

To make the supply channel explicit, Figure 3 plots the gap in deviations, $D_f - D_V$. Because the belief terms cancel, the gap isolates the risk–discount scaling by supply:

$$D_f - D_V = \frac{A}{r} \sigma_X^2 (s_t^* - 1).$$

Positive values (issuance, $s_t^* > 1$) indicate a larger discount in the production economy than in the exchange benchmark; negative values (repurchases, $s_t^* < 1$) indicate the opposite. The amplitude of the gap increases with both θ and σ_Π , consistent with the formula. Empirically in our calibration with $\bar{s} = 1.2$, the gap is positive on average—mirroring that $E[D_V] < E[D_f]$.

Table 2 reports summary statistics that mirror Figures 2–3. Panel A (low σ_Π) and Panel B (high σ_Π) show three robust patterns. First, mean deviations are more negative under production than under exchange for every θ (smaller average mispricing in levels once issuance raises the discount). Second, dispersion (SD, and CV) is uniformly higher in production, reflecting the state-dependent scaling s_t^* . Third, moving from $\sigma_\Pi = 0.25$ to 0.60 shifts the level of both models downward, and proportionally inflates the gap’s volatility. Overall, it is confirmed that endogenous supply both dampens average deviations and widens their dispersion.

4 Conclusion

This study fills a gap in the literature by embedding noise–trader risk in a production economy with endogenous equity supply. In this framework, belief shocks generate time–series mispricing, while firms’ net issuance compresses its average level by exploiting valuation errors. With mean–variance investors, the linear price–supply link induces an interior issuance policy whose strength varies with risk aversion, fundamental risk, and average beliefs. Calibrations show that production economies that issue on net display lower average mispricing than an exchange benchmark; and this gap widens with the prevalence

of noise-trader risk. The framework yields testable implications: (i) equity issuance should rise with sentiment and fall with risk; (ii) the level of mispricing should be smaller where corporate equity supply is more elastic; and (iii) firms' debt-equity mixes should co-move with measures of valuation risk.

References

- [1] Antoniou, C., J. A. Doukas, and A. Subrahmanyam (2016). Investor sentiment, beta, and the cost of equity capital. *Management Science*, 62(2), 347–367.
- [2] Baker, M., and J. Wurgler (2000). The equity share in new issues and aggregate stock returns. *Journal of Finance*, 55(5), 2219–2257.
- [3] Baker, M., and J. Wurgler (2006). Investor sentiment and the cross-section of stock returns. *Journal of Finance*, 61(4), 1645–1680.
- [4] Baker, M., and J. Wurgler (2007). Investor sentiment in the stock market. *Journal of Economic Perspectives*, 21(2), 129–151.
- [5] Baker, M., J. C. Stein, and J. Wurgler (2003). When does the market matter? Stock prices and the investment of equity-dependent firms. *Quarterly Journal of Economics*, 118(3), 969–1005.
- [6] Barberis, N., A. Shleifer, and R. Vishny (1998). A model of investor sentiment. *Journal of Financial Economics*, 49(3), 307–343.
- [7] Black, F. (1986). Noise. *Journal of Finance*, 41(3), 529–543.
- [8] Cochrane, J. H. (1991). Production-based asset pricing and the link between stock returns and economic fluctuations. *Journal of Finance*, 46(1), 207–234.
- [9] Dai, X., Zhang, J., and Chang, V. (2023). Noise traders in an agent-based artificial stock market. *Annals of Operations Research*, 1–30.
- [10] De Long, J. B., A. Shleifer, L. H. Summers, and R. J. Waldmann (1990). Noise trader risk in financial markets. *Journal of Political Economy*, 98(4), 703–738.
- [11] Gomes, J., L. Kogan, and L. Zhang (2003). Equilibrium cross section of returns. *Journal of Finance*, 58(5), 2229–2256.

- [12] Huang, S., Y. Song, and H. Xiang (2024). Noise trading and asset pricing factors. *Management Science*, Articles in Advance.
- [13] Ikenberry, D., J. Lakonishok, and T. Vermaelen (1995). Market underreaction to open market share repurchases. *Journal of Finance*, 50(2), 455–476.
- [14] Keasey, K., C. Lambrinoudakis, D. V. Mascia, and Z. Zhang (2025). The impact of social media influencers on the financial market performance of firms. *European Financial Management*, 31(2), 745–785.
- [15] Loughran, T., and J. R. Ritter (1995). The new issues puzzle. *Journal of Finance*, 50(1), 23–51.
- [16] Machado, C., and A. E. Pereira (2022). Optimal capital structure with stock market feedback. *Review of Finance*, 26(8), 3317–3359.
- [17] Morellec, E., and A. Zhdanov (2019). Product market competition and option prices. *The Review of Financial Studies*, 32(11), 4343–4386.
- [18] Palomino, F. (1996). Noise trading in small markets. *Journal of Finance*, 51(4), 1537–1550.
- [19] Peress, J., and D. Schmidt (2020). Glued to the TV: Distracted noise traders and stock market liquidity. *Journal of Finance*, 75(2), 1083–1133.
- [20] Peyer, U., and T. Vermaelen (2009). The nature and persistence of buyback anomalies. *Review of Financial Studies*, 22(4), 1693–1745.
- [21] Pontiff, J., and A. Woodgate (2008). Share issuance and cross-sectional returns. *Journal of Finance*, 63(2), 921–945.
- [22] Ryu, D., and H. Yang (2019). Noise traders, mispricing, and price adjustments in derivatives markets. *European Journal of Finance*, 25(6), 481–504.
- [23] Shleifer, A., and R. W. Vishny (1997). The limits of arbitrage. *Journal of Finance*, 52(1), 35–55.
- [24] Stein, J. C. (1996). Rational capital budgeting in an irrational world. *Journal of Business*, 69(4), 429–455.

- [25] Stambaugh, R. F., J. Yu, and Y. Yuan (2012). The short of it: Investor sentiment and anomalies. *Journal of Financial Economics*, 104(2), 288–302.
- [26] Trueman, B., (1988). A theory of noise trading in securities markets. *Journal of Finance*, 43(1), pp. 83-95.
- [27] Xu, S. (2023). Behavioral asset pricing under expected feedback mode. *International Review of Financial Analysis*, 86, 102508.
- [28] Zhang, L. (2005). The value premium. *Journal of Finance*, 60(1), 67–103.