Public Inference and Funding Fragility

Price discovery, continuation margin, and future liquidity

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Can sharper prices make funding more fragile?

The puzzle

The price has already learned from order flow.

Why should the broker read that flow again?

- **Price asks:** what is the asset worth now?
- **Funding asks:** what would it cost to unwind later?

Better discovery can tighten funding when adverse flow persists into the closeout window.

Source: V14, Introduction; Theorems 1–2. The tradeoff requires the conditions stated below.

One public record, two economic questions

Dealer: value today

$$p_0 = \mathbb{E}[v \mid y_0]$$

Aggregate flow y_0 informs beliefs about v.

Broker: closeout later

Expected unwind loss

Own-client information plus residual public flow.

The current mark is settled first. Margin protects against loss *beyond* that mark, not the same loss twice.

Source: V14, Sections 2.2–2.4 and 3.3–3.4.

Adverse flow depends on the position

Financed position	Closeout trade	Adverse persistent flow
Long	Sell	Other accounts selling
Short	Buy back	Other accounts buying

Persistence is the distinction

Deadline hedging can move today's price, yet end before the closeout window.

Sign the flow by the position; then ask what persists.

Source: V14, Lemma 1; Lemma 3; signed revision in equation (3.5).

A binding reset connects inference to depth

Aggregate order flow $\longrightarrow$ dealer price and settlement

$\downarrow$

Broker forecasts future closeout loss

$\downarrow$

Continuation margin rises

$\downarrow$

If equity is insufficient: forced position reduction

$\downarrow$

Absorbers retain inventory $\longrightarrow$ future depth weakens

Source: V14, Figure 1; equations (2.12), (3.15), and (4.4). Schematic of the theoretical mechanism.

The contribution is the post-price trigger

- **Microstructure:** start from competitive learning from aggregate flow, as in Kyle (1985).
- **Funding liquidity:** retain the margin–liquidation–depth feedback of Brunnermeier–Pedersen (2009).
- **Distinct trigger:** the persistent, position-adverse composition of flow informs a bilateral closeout requirement after settlement.

Fragmentation and frictionless neutrality identify where this additional channel has content.

Source: V14, Introduction; Propositions 1 and 4. Full references in the appendix.

The two readings

Settlement comes before the funding decision

Date 0 Trade $\rightarrow$ price p_0 $\rightarrow$ settle equity.

Date 1 Broker observes the account and resets margin.

Date 2 Payoff v; remaining positions settle.

Requirement met

The client's planned trades continue.

Requirement not met

Cancel that plan; the broker liquidates instead.

Source: V14, Figure 2; Table 1; equations (2.8)–(2.11).

Who knows what, and who bears inventory?

Agent	Information or economic role
Informed accounts	Private signals; choose targets and execution schedules.
Deadline hedgers	Uninformed flow that ends at date 0.
Dealers	Observe aggregate flow; price terminal value.
Prime brokers	Observe their own client, not all other financed accounts.
Strategic absorbers	Supply closeout immediacy; retain costly inventory.

Source: V14, Sections 2.1–2.4; $N \geq 2$ account–broker pairs, $L \geq 3$ absorbers in the baseline.

The settled mark fixes equity before the reset

$$q_1^i = q_0^i + x_0^i, \qquad Q_1^i = |q_1^i|, \qquad e_1^i = e_0^i + q_0^i p_0.$$

- q_0^i: inherited signed position; x_0^i: executed net order.
- Q_1^i: financed exposure; e_1^i: post-price equity.
- The new order executes at p_0: its cash leg offsets its contemporaneous marked value.

Only repricing the inherited position changes equity immediately.

Source: V14, Equation (2.2); Section 2.2. Work locally on a fixed-sign region, $q_1^i \neq 0$.

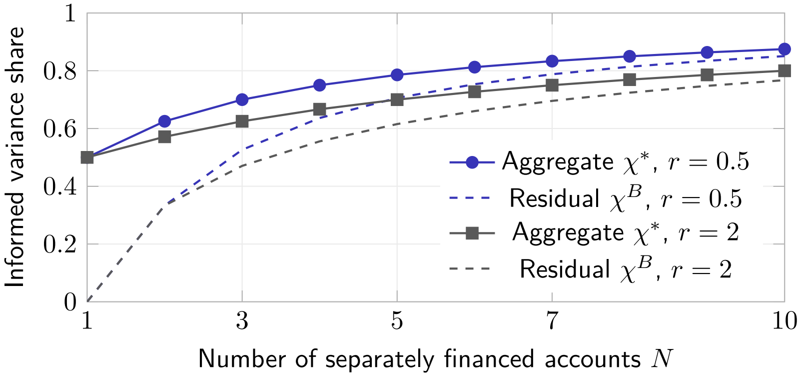
Fragmentation leaves something to infer

$$y_0^{-i} = y_0 - x_0^i, \qquad \chi^B = \frac{\omega\chi}{1 - \chi + \omega\chi}.$$

- The broker subtracts its own client's known order.
- χ: informed share of aggregate flow variance; χ^B: the paper's broker-residual share.
- With one financed informed account, the broker can invert its client's order: the incremental public-flow channel shuts down.

Source: V14, Proposition 1; $\omega = \nu_{N-1}/\nu_N$, $\nu_N = N(N+r)$, $r = \sigma_\eta^2/\sigma_v^2$.

Fragmentation leaves more residual information



Source: V14, Figure 3, reconstructed with V14 numerical code; frictionless trading benchmark.
Exact model curves, not estimates. r: signal-noise variance ratio.

Gradual execution makes flow persist

- The residual private edge satisfies $\mathbb{E}[\delta^j \mid y_0] = 0$: public flow cannot predict an orthogonal residual.
- Costly immediate execution and carrying costs generate a gradual execution schedule.
- Planned continuation is $x^i_{1,j} = \varphi^j x^i_0$, with $0 < \varphi < 1$.

$$\psi_A = \frac{1}{J} \sum_{j=1}^{J} \varphi^j \in (0, 1).$$

Source: V14, Lemmas 2–3; Assumption 3 (stationary execution window). J: closeout slices; ψ_A: average continuation-flow loading.

Build the reset statistic in three steps

1. Direction: $z_s^i = -\operatorname{sgn}(q_1^i)\,\kappa(y_0 - x_0^i)$,
2. Scale: $a^{+,i} = \mathbb{E}[z_s^i \mid z_s^i \geq 0]$,
3. Composition: $A^{\mathrm{AS},i} = \underbrace{\tau^B}_{\chi^B}\, a^{+,i}$.

- $z_s^i > 0$: adverse to the position; κ: dealer price impact.
- ψ_A then loads this statistic into expected closeout loss.

Adverse half-tail statistic $\neq$ realized account loss.

Source: V14, Definition 3; Lemma 4; equations (3.5)–(3.8). The statistic is an adverse half-tail object, not a realized loss.

$$\mu_U = \underbrace{\psi_A A^{\mathrm{AS},i}}_{\text{persistent adverse flow}} + \underbrace{\psi_\lambda \lambda_0}_{\text{standing illiquidity}} + \underbrace{\psi_Q Q_1^i}_{\text{position size}} .$$

- Loss is measured per unit *beyond the settled mark*.
- Finite strategic absorber capacity generates ψ_Q; it is not an arbitrary impact slope.
- Margin prices the exposure Q_1^i that may need closing. A realized sale incurs the size term on ΔQ^i instead.

Source: V14, Proposition 2, on the paper's adverse branch; Lemmas 5–6. λ_0: entering illiquidity.

Margin covers expected loss plus a tail buffer

Expected uncovered-loss constraint

$$\mathbb{E}\Big[(Q_1^i U_s - m_1^i Q_1^i)^+ \mid \mathcal{H}_1^i\Big] \leq \bar{\ell}.$$

$$m_1^i = \mu_U + \sigma_\varepsilon b(Q_1^i).$$

- U_s: per-unit closeout loss; $\bar{\ell}$: broker capital allocated to the account.
- $\sigma_\varepsilon b(Q_1^i)$ is the residual tail-loss buffer.
- One additional unit of expected loss raises margin one for one.

Source: V14, Assumption 2; Lemma 7. Restricted collateral-plus-reduction contract, not a full optimal-contracting result.

Theorem 1: the composition prediction

$$\left.\frac{\partial m_1^i}{\partial \tau^B}\right|_{a^{+,i}} = \psi_A a^{+,i} > 0.$$

- Raise the persistent share τ^B; keep revision scale fixed.
- Hold exposure, illiquidity, residual-risk scale and ψ_A fixed.
- A scale-only requirement misses this change.

Composition matters beyond "bad news raises margin."

Residual-risk extension

Source: V14, Theorem 1(ii); Corollary 1. The active channel requires fragmented brokerage.

Price discovery and funding

The cost of carry connects the two markets

$$\gamma_{\text{coll}} \geq 2k\psi_Q, \qquad \psi_Q = \frac{w}{JL}\left[\frac{L-1}{L-2} + \frac{J-1}{2}\right].$$

- γ: curvature of marginal position-carrying costs.
- k: collateral opportunity cost; w: absorber inventory-cost curvature.
- The same absorber capacity affects the closeout concession, the funding wedge, and future illiquidity.

$\gamma \approx 2k\psi_Q$ is a leading approximation, not the full wedge identity.

Source: V14, Proposition 3; equations (3.17)–(3.19). L: absorbers; J: slices. Full remainder requires Appendix B.7 regularity.

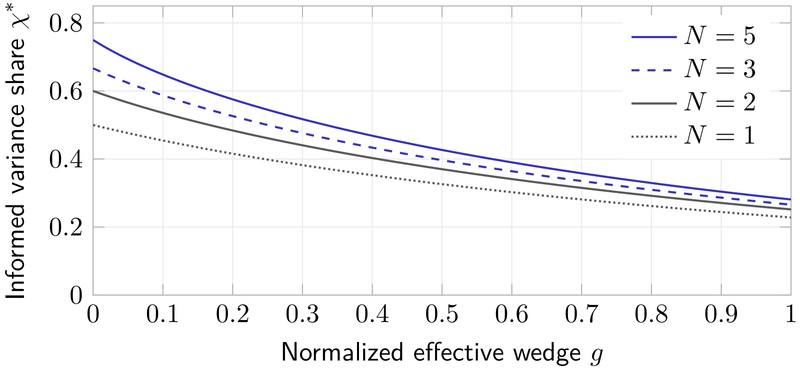
Equilibrium trading has a frictionless ceiling

$$\frac{1}{\bar{\chi}_N}\frac{\zeta^2}{1+\zeta^2} + G(\zeta) = 1, \qquad \chi^* = \frac{\zeta^{*2}}{1+\zeta^{*2}} \le \bar{\chi}_N.$$

- ζ: informed order intensity normalized by hedging-flow scale.
- $\bar{\chi}_N = (N+r)/(N+1+2r)$ is the frictionless ceiling.
- $G(\zeta) = g(\zeta)\zeta$ embeds funding *and* execution costs; at a given wedge it is increasing and yields a unique root.

Source: V14, Lemma 8. Given-wedge uniqueness does not establish global uniqueness of the outer funding equilibrium.

A funding wedge lowers the informed share



Source: V14, Figure 4, reconstructed with V14 code at $r = 1$. Exact normalized trading-block curves, not a calibration or an ex-ante policy experiment.

Without the wedge, thinner hedging is neutral

Frictionless trading-block benchmark: $\gamma = 0$

$$\chi^* = \bar{\chi}_N \quad \text{for every hedging scale } \sigma_u.$$

- Informed order intensity scales with hedging flow.
- Composition, price informativeness, and the adverse revision scale remain unchanged.
- The public-inference margin component is unchanged at a fixed funding state.

Source: V14, Proposition 4. This is a limit of the trading block: the position target diverges as $\gamma \downarrow 0$.

Thinner hedging raises the informed share

Theorem 2: positive wedge; fixed curvature γ

When hedging-flow scale σ_u falls, informed trading shrinks *less*. Its variance share and price informativeness rise.

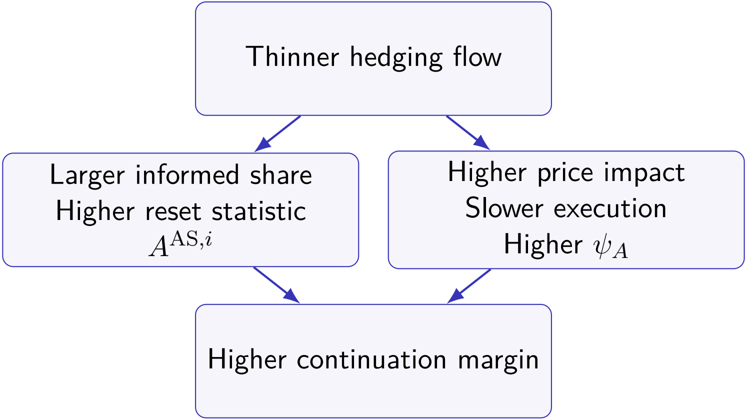
- Condition 1 holds the funding state fixed.
- Funding tightens only if composition outweighs any offsetting change in execution persistence.

The discovery sign is established here. The funding sign needs the next condition.

▸ Exact elasticity condition

Source: V14, Theorem 2; Condition 1. Funding state held fixed. An unrestricted outer-equilibrium response is not signed.

Low wedge: composition and persistence reinforce



Source: V14, Condition 2 and Corollary 2, with Condition 1. Schematic; this sign is conditional, not global.

Two comparisons answer different questions

Thinner-hedging experiment

Fix fundamental volatility. Price informativeness *and* the scale of revisions can rise.

Composition experiment

Condition on revision scale. Ask whether its persistent share changes funding.

- Lemma 9 holds aggregate a^+ fixed by jointly varying signal noise and hedging scale.
- Aggregate a^+ is not broker-residual $a^{+,i}$.

Scale mapping

Source: V14, Theorems 1–2; Lemma 9; Section 6.1. Feasibility requires the target share below the frictionless ceiling.

From a margin call to liquidation

Account slack determines whether anything is sold

$$\xi^i = e_1^i - m_1^i Q_1^i.$$

Slack: $\xi^i \geq 0$

The account meets the reset.

Funding terms change, but there is no forced reduction.

Deficiency: $\xi^i < 0$

The requirement exceeds equity.

The broker cancels continuation and invokes its reduction right.

Source: V14, Definition 1; Proposition 5(i). No *incremental forced-sale* depth effect under slack, relative to the same inventory baseline.

Selling releases margin but also destroys equity

$$\Delta Q^i = \max\left\{0,\ Q_1^i - \frac{\bar{e}_1^i(\Delta Q^i)}{m_1^i(\Delta Q^i)}\right\}.$$

$$\begin{aligned} \text{Concession:} \quad & \bar{C}(\Delta Q) = \psi_A A^{\mathrm{AS},i} + \psi_\lambda \lambda_0 + \psi_Q \Delta Q, \\ \text{Equity left:} \quad & \bar{e}_1^i(\Delta Q) = e_1^i - \Delta Q\, \bar{C}(\Delta Q). \end{aligned}$$

V14 updates the requirement's **depth term**; its size and tail buffer retain inherited exposure Q_1^i.

▸ Exact margin rule

Source: V14, Equations (4.1)–(4.4). V14 retains inherited Q_1^i in the requirement's size and buffer terms; only its depth term updates.

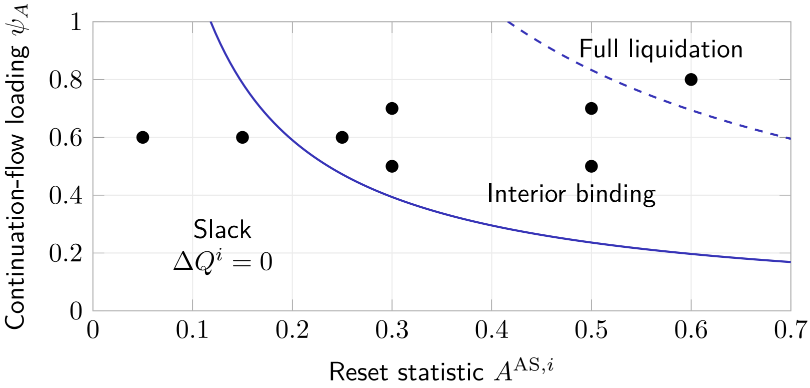
A binding call has two feedback loops

$$\Xi = \underbrace{\frac{\bar{C} + \Delta Q \psi_Q}{m_1^i}}_{\text{equity erosion}} + \underbrace{\frac{\bar{e}_1^i \psi_\lambda w}{(m_1^i)^2}}_{\text{depth raises margin}} .$$

- Sales reduce equity and leave costly absorber inventory.
- On the stable interior branch, amplification is $1/(1 - \Xi)$.
- A tail-loss buffer helps collateral relief exceed sale damage.

▸ Branch conditions ▸ Full derivative

Source: V14, Proposition 5; equation (4.5). Stability and endpoint conditions are necessary; $\bar{C}/m_1^i$ alone is not the full loop gain.



Source: V14, Figure 5 and Table 2; exact boundaries reconstructed from illustrative primitives.
Dots: Table 2 cases. Not estimates. $0 < \psi_A < 1$; upper edge is a limit.

Illustration: larger loading, larger forced sale

$\psi_A A^{\mathrm{AS},i}$	ΔQ^{i*}	Ξ	λ_1	Regime
0.030	0.000	—	0.121	Slack
0.150	0.181	0.504	0.175	Interior
0.210	0.505	0.541	0.273	Interior
0.350	1.197	0.600	0.480	Interior
0.480	1.500	—	0.571	Full

- Inherited exposure is $Q_1^i = 1.5$ and equity is $e_1^i = 0.75$.
- Full liquidation here is reached when full-unwind concessions exhaust equity, before runaway feedback.

Source: V14, Selected rows of Table 2, recomputed with V14 code. Arbitrary model units; illustration, not calibration. Complete primitives and rows in appendix.

Retained inventory weakens future depth

$$X_1 = \phi_X X_0 + \sum_i \Delta Q^i, \qquad \lambda_1 = \lambda_{\min} + w X_1.$$

- X_0, X_1: absorber inventory before and after the reset.
- ϕ_X: retention of standing inventory; placement gradually restores capacity.
- Each extra unit liquidated raises subsequent illiquidity by w, holding the other sales fixed.

The information shock becomes an execution-capacity shock only if it moves quantities into scarce balance-sheet capacity.

Source: V14, Equation (2.12); Section 4.5. Higher λ means greater illiquidity, hence weaker depth.

Welfare and testable implications

- The broker sets sensitivity ψ_A to protect its allocated capital against closeout loss.
- A binding reset forces inventory onto absorbers, weakening later execution conditions.
- Other financed accounts and later market users bear costs outside that bilateral contract.

This is a future-user liquidity externality, not a claim that every protective margin is excessive.

Source: V14, Lemmas 10–11; Section 5. The model-internal component is positive for $N \geq 2$, $k > 0$, and $\psi_\lambda > 0$.

The welfare gain is local, not an ex-ante ranking

$$V(\hat{\psi}) = \underbrace{\frac{\Gamma_B}{2}(\psi_A - \hat{\psi})^2}_{\text{private mis-calibration cost}} + \underbrace{c_\lambda \mathcal{A}_{\inf}(\hat{\psi})}_{\text{future-user term}} .$$

- Fix the plan, price, exposure and equity; remain on a stable interior binding branch.
- At $\hat{\psi} = \psi_A$, the private cost has zero slope.
- If $c_\lambda > 0$ and $\mathcal{A}'_{\inf}(\psi_A) > 0$, a small sensitivity reduction lowers this local objective.

▸ Scope of the welfare result

Source: V14, Proposition 6; equations (5.1)–(5.4). Γ_B: private-cost curvature; c_λ: marginal future-user cost; $\mathcal{A}_{\inf}$: depth-transmission coefficient.

Test the sequence, not just co-movement

Step	Required observation
Inference	Position-signed residual flow and revision scale.
Reset	Bilateral margin and post-settlement slack.
Forced sale	Contractual reduction and execution concession.
Aftermath	Subsequent depth and retained inventory.

Link the stages within the same account and reset window.

What public data cannot identify

Source: V14, Section 6.2. These are data requirements and theoretical predictions, not an implemented empirical test.

Where the chain stops is part of the prediction

Shutdown condition	Prediction for this channel
No incremental persistent-flow content	No public-inference margin component.
Reset absorbed by strict slack	No forced reduction or sale-induced depth loss.
Elastic marginal absorption	A forced sale leaves little or no incremental illiquidity.

Margin–liquidity co-movement alone does not establish this mechanism.

Source: V14, Proposition 1(i); Proposition 5(i); Sections 4.5 and 6.5. Compare against the same baseline state and other accounts' sales.

Three findings to take away

1. **Price is not the end of inference.**
   Persistent, position-adverse flow informs closeout funding.
2. **Discovery and funding can move against each other.**
   The wedge activates the tradeoff under the stated conditions.
3. **Binding is the bridge to future liquidity.**
   Forced sales leave inventory and a local future-user externality.

Source: V14, Theorems 1–2; Propositions 5–6; Conclusion. Theory and illustrative numerics, not causal empirical evidence.

Discussion

More informative markets can still be fragile.

Paper: Public Inference and Funding Fragility

www.aryanayyar.com

Technical appendix

Information and scales
Tradeoff conditions

Liquidation rule
Stability
Welfare

◂ Three findings

Gaussian normalization and broker information

$$v \sim N(0, \sigma_v^2), \quad s_0^i = v + \eta^i, \quad u_0 \sim N(0, \sigma_u^2),$$
$$r = \sigma_\eta^2 / \sigma_v^2, \quad \rho_N = \frac{N}{N + r}, \quad \nu_N = N(N + r).$$

- Signal noises are independent across accounts and independent of payoff and hedging need.
- Dealers observe y_0; broker i also observes its client's executed order and post-price account state.
- The second reading is not new public fundamental information.

Source: V14, Section 2.2, footnote 1; information sets in equation (2.3); Appendix A.

Aggregate and residual scales are not interchangeable

$$I^* = \mathrm{Var}(v) - \mathrm{Var}(v \mid y_0) = \rho_N \sigma_v^2 \chi^*,$$
$$a^+ = \sqrt{2/\pi}\sqrt{I^*},$$
$$a^{+,i} = a^+ \sqrt{\frac{1-\chi^*}{1-\chi^B}}, \qquad A^{\mathrm{AS},i} = \chi^B a^{+,i}.$$

- I^*: price informativeness; a^+: aggregate adverse half-tail scale.
- $a^{+,i}$: broker-residual adverse half-tail scale after subtracting its client's order.
- As $N \to \infty$, the broker statistic approaches $\chi^* a^+$.

Back to talk

Source: V14, Equations (3.5)–(3.8); Lemma 8. Maintain the paper's normalization.

Execution persistence is endogenous

$$\Upsilon = \frac{\sqrt{\gamma^2 + 8J\kappa\gamma} - \gamma}{2},$$
$$\widetilde{\gamma} = \gamma + \Upsilon, \qquad \varphi = \frac{2J\kappa}{2J\kappa + \widetilde{\gamma}},$$
$$x_0^i = (1-\varphi)T^i, \qquad x_{1,j}^i = \varphi^j x_0^i.$$

- Υ: marginal execution cost; T^i: planned signed adjustment.
- Larger $\gamma/(J\kappa)$ front-loads execution and lowers persistence.
- These planned slices execute only on continuation; liquidation cancels the client's remaining plan.

Source: V14, Lemma 3; equations (3.1), (3.21); Appendix B.4.1. Stationary-window assumption maintained.

Strategic capacity determines the concession

$$\Lambda = \frac{w}{L-2}, \qquad \alpha = \frac{L(L-2)}{w(L-1)},$$
$$C_j = h_j + d\lambda_0 + \frac{(1+\varpi_j) r_j \Delta Q}{\alpha}, \qquad r_j = \frac{1}{J}.$$

- Λ: each absorber's price impact; α: aggregate demand slope.
- h_j: adverse continuation pressure; ϖ_j: inventory accumulated from earlier slices.
- Uniform weights are optimal under the paper's symmetric, pre-flow scheduling convention.

Source: V14, Lemmas 5–6. Predictable drift or execution-risk aversion can change optimal slice weights; those are not the maintained problem.

The tail-loss buffer follows from an inverse transform

$$\mathcal{E}(c) = \mathbb{E}[(\varepsilon_s - c)^+],$$
$$b(Q) = \mathcal{E}^{-1}\left(\frac{\bar{\ell}}{Q\sigma_\varepsilon}\right), \qquad b'(Q) > 0,$$
$$m_1^i = \psi_A A^{\mathrm{AS},i} + \psi_\lambda \lambda_0 + \psi_Q Q_1^i + \sigma_\varepsilon b(Q_1^i).$$

- ε_s is standardized residual closeout risk; σ_ε its scale.
- The residual stop-loss transform is strictly decreasing on the interior range used here.
- Post-price account equity belongs in feasibility, not as a second subtraction inside this loss calibration.

Source: V14, Lemma 7; Lemma B.2. A quantile or expected-shortfall rule is a different contract.

Composition and residual risk can both move margin

$$\frac{\partial m_1^i}{\partial A^{\mathrm{AS},i}} = \psi_A + M_\sigma \frac{\partial \sigma_\varepsilon}{\partial A^{\mathrm{AS},i}}, \qquad M_\sigma > 0.$$

- Baseline: residual closeout-risk scale is fixed.
- If adverse composition raises residual risk, both effects reinforce.
- The sign reverses only if residual risk falls enough to offset the mean-loss effect: $\partial \sigma_\varepsilon / \partial A^{\mathrm{AS},i} < -\psi_A / M_\sigma$.

Back to talk

Source: V14, Corollary 1; equation (3.16). M_σ: margin sensitivity to residual-risk scale.

Exact conditions behind the funding sign

$$\operatorname{sign}\left(-\frac{\partial m_1^i}{\partial \sigma_u}\right) = \operatorname{sign}(\varepsilon_\psi + \varepsilon_A), \quad \varepsilon_A \geq 3/2.$$

$\varepsilon_\psi = d \ln \psi_A / d \ln \chi^*$; $\varepsilon_A = d \ln A^{\mathrm{AS},i} / d \ln \chi^*$.

Condition 2: low-wedge restriction

$$\varepsilon_\chi(2\chi^* - 1) < 2\chi^*(1 - \chi^*), \qquad \varepsilon_\chi = \frac{d \ln \chi^*}{d \ln \sigma_u} < 0.$$

- Holds near the frictionless benchmark; makes price impact fall with hedging scale.
- Outside it, use the elasticity test, not a global funding sign.

Back to talk

Source: V14, Theorem 2; Condition 2; Corollary 2. Condition 1 separately holds wedge curvature γ fixed.

What the liquidation rule updates

$$m_1^i(\Delta Q) = \psi_A A^{\mathrm{AS},i} + \psi_\lambda[\lambda_{\min} + w(\phi_X X_0 + \Delta Q)] + \psi_Q Q_1^i + \sigma_\varepsilon b(Q_1^i).$$

- The depth-dependent term changes with the induced sale.
- The size and tail-buffer terms retain inherited exposure Q_1^i.
- The actual concession instead uses $\psi_Q \Delta Q$, and the remaining position is $Q_1^i - \Delta Q$.

Back to talk

Source: V14, Equations (4.1)–(4.4). This is the V14 timing convention, not a fully re-contracted residual-size margin schedule.

Stable liquidation is distinct from multiplicity

$$G(\Delta Q) = Q_1^i - \frac{\bar{e}_1^i(\Delta Q)}{m_1^i(\Delta Q)} - \Delta Q, \qquad G' = \Xi - 1.$$

- **Unique interior cure:** $G(0) > 0$, $G(Q_1^i) < 0$, and $\Xi < 1$ throughout the feasible interval.
- **Full liquidation:** with $G(0) > 0$, either $G(Q_1^i) \geq 0$ and $\Xi < 1$ throughout, or $\Xi \geq 1$ throughout.
- If Ξ crosses one, multiple interior roots can occur. This region is not automatically a full-liquidation corner.

Back to talk

Source: V14, Proposition 5. Boundary statements require interval conditions, not merely Ξ at a single point.

The full derivative includes equity erosion

$$Q_m = \frac{\bar{e}_1^i}{(m_1^i)^2}, \qquad \frac{\partial \Delta Q^{i*}}{\partial A^{\mathrm{AS},i}} = \frac{\psi_A (Q_m + \Delta Q^{i*}/m_1^i)}{1-\Xi}.$$

$$\frac{\partial \lambda_1}{\partial A^{\mathrm{AS},i}} = \underbrace{\frac{w Q_m \psi_A}{1-\Xi}}_{\mathcal{A}_{\mathrm{inf}}} + \frac{w \psi_A \Delta Q^{i*}}{(1-\Xi) m_1^i}.$$

- Q_m: direct margin-to-liquidation sensitivity at the induced root.
- $\mathcal{A}_{\mathrm{inf}}$ is a lower bound on the full depth response, not the entire derivative.

◂ Back to talk

Source: V14, Proposition 5(ii); equations (4.6) and (4.9). Stable interior binding branch, other inputs fixed.

All eight illustrative liquidation cases

$A^{\mathrm{AS},i}$	ψ_A	ΔQ^{i*}	Ξ	m_1^i	λ_1
0.05	0.60	0.000	—	0.412	0.121
0.15	0.60	0.000	—	0.472	0.121
0.25	0.60	0.181	0.504	0.543	0.175
0.30	0.50	0.181	0.504	0.543	0.175
0.30	0.70	0.505	0.541	0.622	0.273
0.50	0.50	0.711	0.561	0.675	0.334
0.50	0.70	1.197	0.600	0.804	0.480
0.60	0.80	1.500	—	0.952	0.571

Equal products: identical outcomes. Dashes: no interior loop gain.

Source: V14, Table 2, recomputed from V14 code. First two cases: slack; last: full liquidation; others: interior. Illustrative model units only.

Symbol	Meaning	Value
J, L	Closeout slices; absorbers	$4, 6$
d, w	Illiquidity cost; inventory curvature	$0.20, 0.30$
$\lambda_{\min}, \phi_X, X_0$	Floor; retention; prior inventory	$0.10, 0.35, 0.20$
$\sigma_\varepsilon, \bar{\ell}, k$	Residual risk; capital; carry cost	$0.25, 0.02, 0.02$
Q_1^i, e_1^i	Exposure; settled equity	$1.50, 0.75$

$$\psi_Q = 0.034375, \qquad \sigma_\varepsilon b(Q_1^i) \simeq 0.306.$$

Source: V14, Table 2. Parameters are illustrative and unestimated. At fixed $\psi_A A^{\mathrm{AS},i} = 0.21$, full liquidation starts near $w = 1.27$.

Local sensitivity is not an ex-ante policy ranking

$$\frac{\partial \Delta Q^{i*}}{\partial \hat{\psi}} = \frac{Q_m A^{\mathrm{AS},i}}{1-\Xi} > 0, \qquad \frac{\partial \lambda_1}{\partial \hat{\psi}} = w \frac{\partial \Delta Q^{i*}}{\partial \hat{\psi}} > 0.$$

- Vary the implemented collateral sensitivity, not the physical closeout-loss loading.
- Price and exposure are inherited, so they cannot change in this post-price comparison.
- An anticipated rule change can alter earlier trading, information, leverage, and binding probability; those broader welfare effects are not signed.

◂ Back to talk

Source: V14, Proposition 6; Lemma 12; Section 5.4. The additional welfare condition $\mathcal{A}'_{\mathrm{inf}}(\psi_A) > 0$ remains explicit.

Public-market measures are not the full bilateral test

- Total-flow toxicity can proxy for composition, but the broker's object is residual flow net of its own client and signed by exposure.
- Exchange and clearinghouse margin changes are external analogues; they omit the bilateral account state required here.
- A direct test needs signed positions, slack, margin resets, and actual closeouts linked within the same window.

Back to talk

Source: V14, Sections 6.1–6.5. Proxies remain proxies; no empirical identification or estimated effects are claimed in this deck.

Selected references

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Source: V14, Bibliography. Primary source for all results and illustrations: Aryan Ayyar, *Public Inference and Funding Fragility*, V14 (13 August 2026).