Cross-Asset Liquidity & Positioning Intelligence Engine

Internal execution-intelligence framework | liquidity, volatility, positioning & market structure

CROSS-ASSET INTELLIGENCE ENGINE

DECISION-ENGINE ARCHITECTURE

Data state rates / FX / oil / vol → **Signal engine** speed + residuals → **Fragility layer** liquidity + crowding → **Decision router** trade / size / route → **Feedback** slippage + hit-rate

OPERATING PREMISE

Modern cross-asset execution is dominated by liquidity transmission, positioning reflexivity and volatility amplification. The engine ranks which market-state changes should alter execution timing, risk limits and trade expression before liquidity becomes expensive. Signals escalate only when magnitude, speed, crowding and liquidity all point to the same transmission channel simultaneously.

EXECUTION-FRAGILITY BANDS

Signal	Normal	Watch	Escalate
MOVE percentile	<50	50 - 80	>80
Depth change	0/-10%	-10/-25%	>-25%
Spread state	Normal	Wider	Elastic
Flow risk	Balanced	Crowded	Forced

CORE OUTPUT MAP

Signal	Read-through	Decision consequence
Rates-vol alert	Policy path + term-premium channel active	Own event gamma / payer hedge
Liquidity fragility	Price impact becoming nonlinear	Reduce clip; work passive
CAD/oil disconnect	Commodity beta capped by USD/rates-vol	CAD crosses before outright
Curve stress	Auction + inflation premium repricing	Conditional steepeners

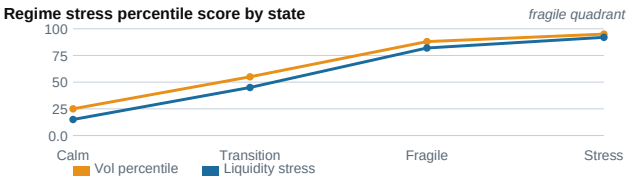
HISTORICAL FRAGILITY REFERENCE POINTS

Episode	Market lesson	Engine implication
Mar-2020 UST stress	Depth vanished despite safe-haven demand	Liquidity state can dominate macro direction
UK LDI shock	Duration + leverage forced selling loop	Track convexity, margin, forced flow signals
Vol-control unwind	Vol-targeting amplified price moves	Flow rules matter during realised-vol spikes

SIGNAL CALIBRATION GUIDE

Parameter	Threshold	Desk action
Speed threshold	>1 std dev / hour	Flag for escalation review
Depth threshold	>15% book decline	Shift execution to passive mode
MOVE threshold	>80th percentile	Own event gamma; reduce carry exposure
Cross-confirm rule	3+ layers align	Escalate to full cross-asset protocol

FIG -- REGIME PROGRESSION: VOL & LIQUIDITY STRESS



GOVERNANCE & REALISM CONTROLS

Risk	Control	Why it matters
False precision	Confidence bands + source freshness flags	Prevent pseudo-certainty in signals
Data quality	Stale-feed flags + reconciliation checks	Prevent bad alerts from stale inputs
Over-alerting	Severity score + cooldown periods	Protect desk attention bandwidth
Model drift	Threshold review + event post-mortems	Adapt to regime and structural change

Sources: Federal Reserve H.15; Bank of Canada Daily Digest; EIA; BLS; Statistics Canada; CFTC

SIGNAL ENGINE: LAYER TRANSFORMS

Layer	Transform	Decision signal
Rates / curve	Path repricing + slope speed + supply window	Steepener / payer / event gamma
FX / CAD	Oil beta residual + USD impulse + COT crowd	Crosses vs outright USD/CAD
Volatility	MOVE/VIX pctile + implied-realised spread	Own gamma or reduce carry
Liquidity	Spread/depth z-score + funding stress	Sizing, routing, escalation

A signal becomes actionable only when it changes the trade expression. The same directional thesis can move from delta to option, RV or passive execution as liquidity and vol states migrate across regimes.

CROSS-ASSET INTERACTION HEATMAP (0=low, 4=high)

	Rates	CAD	Oil	Vol
Rates	0	3	2	4
USD/CAD	3	0	3	4
WTI	2	3	0	3
MOVE	4	4	3	0

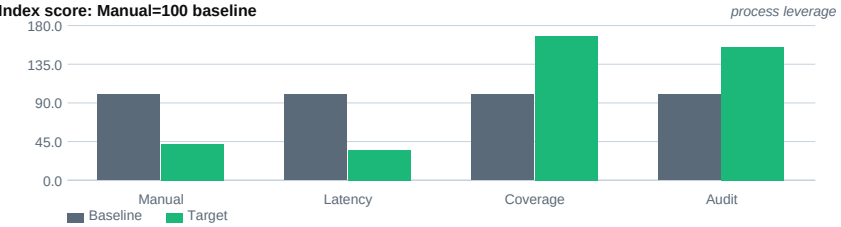
SIGNAL ESCALATION RULES

Rule	Desk implication
Magnitude + speed	Move from monitor to alert
3+ layers align	Treat as cross-asset transmission event
Liquidity deteriorates	Reduce clip size; shift to passive execution
Catalyst < 48 hours	Raise event-vol sensitivity; pre-position optionality

RANKED DECISION PACK

Rank	Signal	Implementation
1	Rates-vol persistence	Event gamma; avoid carry-only exposure
2	Liquidity fragility	Vol-adjust sizing; monitor bid/offer and slippage
3	Curve term-premium risk	Conditional steepeners / payer hedges on supply

FIG -- PROCESS EFFICIENCY: BASELINE vs TARGET



DATA SOURCES: ENGINE INPUTS

Asset class	Primary sources	Signal use
Rates / curve	Fed H.15, BoC digest, CME FedWatch	Term structure + policy path inputs
FX / CAD	CFTC COT, CEER, Bloomberg spot	Positioning + broad USD state
Vol / liq.	ICE MOVE, VIX, bid/ask depth feeds	Regime classification + escalation
Commodities	EIA, ICE Brent, WTI futures strip	Oil signal + inflation pass-through

EXECUTION QUALITY FEEDBACK METRICS

Metric	Definition	Engine purpose
Slippage vs signal	Actual fill vs mid at alert time	Measures execution value of engine
Alert accuracy	Hit rate: signal to realised move	Guides threshold calibration cycles
Timing value	Latency: signal to execution	Core automation case for speed edge
Expression lift	Option vs delta post-event P&L	Validates expression-selection logic

STRATEGIC VALUE

The engine is useful only if it changes decisions: when to trade, how to express the view, how much to size, whether to seek immediacy, and when to monetise optionality or stand down. Convert fragmented monitoring into a governed decision engine that links market state, execution quality and post-trade learning.

ALERT HIERARCHY & RESPONSE LEVELS

Level	Response	Execution implication
Monitor (0-1 signal)	Track only	Baseline; no execution change required
Watch (2 signals)	Adjust clip size	Reduce order size; log desk note
Escalate (3 signals)	Full protocol	Routing, expression and sizing review
Cross-asset (all)	Desk alert	Immediate review; notify risk desk

Sources: Federal Reserve H.15; Bank of Canada Daily Digest; EIA; BLS; Statistics Canada; CFTC COT; CME FedWatch; ICE BofA M

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AUTOMATION WORKFLOW

Data state curves / FX / oil / vol → **Rules engine** threshold + context → **Fragility score** liquidity + crowding → **Desk action** trade / size / route

The automation edge is not forecasting precision; it is reducing reaction latency and making execution rules explicit before markets shift from continuous repricing to gapped liquidity. Under fragility, execution style is part of the thesis: passive execution preserves price but risks information leakage; aggressive execution secures immediacy but pays spread elasticity.

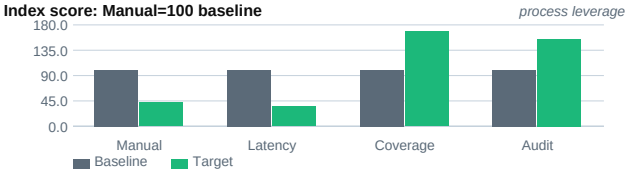
TRIGGER-CONDITION ENGINE

Signal	Trigger condition	Operational response
Rates vol	MOVE high + CPI/FOMC data window	Event gamma; payer-spread hedge
Liquidity	Spread/depth stress confirmed	Reduce clip; shift execution style
CAD squeeze	COT short + oil/BoC alignment	CAD crosses; avoid naked USD/CAD
Curve stress	2s10s speed + auction pressure	Conditional steepeners + convexity

EXECUTION SEQUENCING LOGIC

Step	Decision rule	Desk nuance
1 -- Confirm signal	Magnitude + speed + cross-asset context	Avoid single-indicator false positives
2 -- Check liquidity	Size + route from spread-depth state	Clip size follows depth, not conviction
3 -- Select expression	RV / options / crosses before delta	Preserve optionality under path risk
4 -- Learn + retune	Alert vs slippage vs realised vol	Retune thresholds and cooldown windows

FIG -- PROCESS IMPROVEMENT (BASELINE vs TARGET)



MARKET-MICROSTRUCTURE PLAYBOOK

State	Engine action
Depth deterioration	Reduce clip; increase order slicing
Stop-loss cascade	Flag trigger levels; wait for follow-through confirmation
Gamma / expiry risk	Avoid false calm; own event optionality selectively
Correlation break	Shift from directional to relative-value expression

POSITIONING SQUEEZE MATRIX

Crowding	Catalyst	Preferred response
Short CAD	BoC meeting / oil move	CAD crosses; avoid naked USD/CAD shorts
Short vol	FOMC / CPI print	Own event gamma selectively ahead of catalyst
Long duration	CPI / supply auction	Payer hedge; reduce outright delta exposure
Risk-beta longs	USD / funding stress	Lower gross exposure; widen stop levels

LIQUIDITY & CATALYST HEATMAP (2=moderate, 4=high risk)

	Open	Data	Auction	Expiry
UST/GoC	2	4	4	3
USD/CAD	2	3	3	4
WTI	2	3	2	3
Rates vol	3	4	4	4

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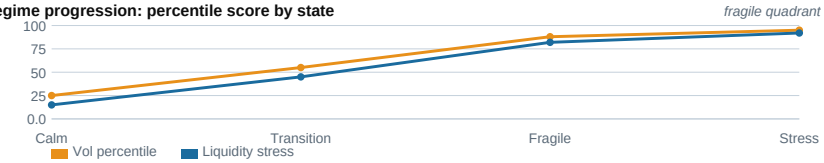

INTRADAY FRAGILITY WATCH WINDOWS

Window	Fragility driver	Execution implication
Open (8-9am ET)	Data lag + positioning reset	Elevated spread/depth; avoid large clips
Pre-data (30 min)	Gamma risk elevated	Reduce clip; own event optionality
Auction window	Supply + demand discovery	Concession risk; watch term-premium
Close / expiry	Systematic rebalancing flows	Correlation instability; model-flow risk

IMPLEMENTATION ROADMAP

Phase	Build scope	Output / milestone
Phase 1	Source map + prototype	Morning pack: rates/FX/vol/oil snapshot
Phase 2	Python + SQL pipeline	Auto-refresh signals; threshold calibration
Phase 3	Alert router + dashboard	Intraday escalation; desk notifications
Phase 4	Feedback + backtest loop	Threshold tuning; post-event P&L linkage

COMMERCIAL & WORKFLOW VALUE

Value lever	Institutional benefit
Monitoring leverage	Fewer manual screens; broader cross-asset coverage per head
Execution timing	Spread/depth alerts before liquidity windows deteriorate
Risk prioritisation	Ranked fragility signals focus desk attention and capital
Process discipline	Audit trail, threshold tuning and systematic post-event review

EXECUTION QUALITY METRICS: POST-TRADE FEEDBACK

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