INVESTMENTS & RESEARCH

Mastering Interest Rate Derivatives

Collateral Management for Capital Markets Products

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Outline

Outline

What is Collateral?

- Financial transactions involve counterparty risk:
  - Risk of one party failing to meet obligations.
- Collateral: asset (cash or securities) pledged to reduce potential losses.
- Common collateral types:
  - Cash
  - Bonds
  - Equities

Why is Collateral Required?

- Reduces Counterparty Credit Risk.
- Limits exposure, minimizing default losses.
- Enhances market stability and investor confidence.

Initial Margin (IM) vs. Variation Margin (VM)

- Collateral management involves posting Initial Margin (IM) at trade start and periodically posting Variation Margin (VM).
- Initial Margin:
  - Upfront collateral to mitigate potential future exposure.
  - Acts as a risk buffer against defaults.
- Variation Margin:
  - Daily settlement reflecting mark-to-market P&L changes.
  - Ensures minimal real-time counterparty credit exposure.

Financial Products Requiring Collateral[2]

- Bilateral OTC Derivatives:
  - Collateral under ISDA Credit Support Annex (CSA).
  - Includes Initial Margin and Variation Margin.
- Centrally Cleared Derivatives:
  - Standardized IM and VM managed by CCPs[1].
- Exchange-Traded Derivatives (Futures/Listed Options):
  - Margin set by exchanges; daily settlement.
- Repos and Securities Lending:
  - Haircut as collateral buffer, akin to IM.
  - Periodic value checks act as quasi-VM.
- To-Be-Announced Securities (TBAs):
  - IM upfront for potential exposure.
  - VM adjusts daily via mark-to-market changes.

[1] Defined on slide 10

[2] Loans excluded; focus on Capital Markets

Entities Involved in Collateral Management - 1

- Bank's Internal Legal Entities
  - Each entity has its own CSA, margin thresholds, and custodial setup.
  - Crucial for managing netting sets, regulatory exposure, and liquidity buffers.
- Counterparties in Transactions
  - Direct trading counterparties for bilateral trades.
  - Governed by ISDA/CSA agreements.
  - Vital for exposure calculations, margin calls, and dispute resolution.
- Futures Commission Merchants (FCMs)
  - Exchange members; first to cover client losses.
  - Post margin to CCPs on clients' behalf.
  - Sometimes also called broker.
  - Handle VM/IM; debit directly from client accounts.
  - Examples: Wells Fargo, BNY Mellon, Deutsche Bank.

Entities Involved in Collateral Management - 2

- Central Counterparties (CCPs)
  - Exchanges with FCMs as intermediaries.
  - Bear counterparty risk for cleared trades.
  - Set margin schedules, eligible collateral, and default fund contributions.
  - Examples: CME, LCH, Eurex, ICE.
- Cash Custodians
  - Manage cash collateral in segregated or pooled accounts.
  - Require SWIFT/Fedwire for margin settlements.
  - Used for IM in bilateral trades and cleared margin.
- Securities Custodians
  - Safeguard and settle pledged securities for margin purposes.
  - Enable eligibility filtering, haircuts, and substitutions.
  - Interface with repo tri-party agents and optimization platforms.

Entities Involved in Collateral Management - 3

- Federal Reserve (USD Payments)
  - Core settlement layer for USD cash collateral via Fedwire.
  - Used by major institutions for DVP (Delivery vs Payment) and FOP (Free of Payment) settlements.
  - Essential for same-day liquidity, efficiency, and regulatory compliance.

Summary of Introduction

- Collateral: Essential for mitigating counterparty risk in capital markets.
- Crucial for maintaining trust and stability in financial systems.
- Core to post-2008 crisis regulations (e.g., Dodd-Frank, EMIR).
- Collateral today is both a risk mitigant and a strategic funding tool
- Effective collateral management is critical for liquidity resilience during market stress

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2008 Crisis: Collateral Weaknesses Exposed

- 2008 crisis exposed flaws in bilateral derivatives margining aka collateral.
- Pre-2008 Practices:
  - Inconsistent collateral practices across counterparties.
  - Uncollateralized exposures caused systemic losses (e.g., Lehman, AIG defaults).
  - CSA terms lacked clarity, enforceability, and legal certainty.
  - Ratings-based thresholds (e.g., downgrade triggers) failed during cliff events.
  - Led to liquidity gaps, procyclical margin calls, and delayed dispute resolution.
- Emphasized need for daily margining, collateral segregation, and robust dispute mechanisms.

Post-2008 Regulatory Collateral Measures

- Key regulatory frameworks post-2008 crisis:
  - UMR (Uncleared Margin Rules):
    - Requires Initial Margin and Variation Margin for uncleared trades.
    - Thresholds based on swap book size based on AANA measure of swap notionals.[3]
  - Dodd-Frank (Title VII):
    - U.S. regulation mandating central clearing, collateral segregation, and UMR compliance.
  - EMIR (EU Regulation):
    - EU counterpart to Dodd-Frank for collateral rules.
    - Enforces clearing, reporting, and OTC derivatives risk management.
  - Basel III:
    - Strengthens global bank capital adequacy, liquidity, and risk management standards.

[3] AANA will be defined later

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Bi-lateral OTC Swaps – Overview

- A bi-lateral over-the-counter (OTC) derivative is a contract between two independent, sophisticated entities; terms negotiated directly.
- Each party manages its own risks and responsibilities.
- Governed by ISDA (International Swaps and Derivatives Association).
- Counterparties follow CSAs defining collateral rules.
- CSA outlines eligible collateral, haircuts, Minimum Transfer Amounts (MTAs), interest on collateral, netting sets, etc.
- Requires both Initial Margin and Variation Margin.

Bilateral OTC Swaps – CSA Collateral Terms

- Example CSA Key Terms:
  - Counterparty: Citibank North America
  - Trade Types: Swaps, Swaptions, Caps/Floors, Money Market instruments and TBAs
  - Eligible Collateral: USD cash, USTs, MBS, corporate bonds
  - Netting Rules: Swaps nettable with swaptions; not with TBAs or repos[4]
  - Haircuts: UST = 2%, MBS = 5%
  - Minimum Transfer Amount (MTA): $250k

[4] Repo is considered a MM instrument

Bilateral OTC Swaps – Initial Margin Overview

- IM required under UMR to mitigate potential future exposure (PFE).
- Two main calculation methods:
  - ISDA Standard Initial Margin Model (SIMM): Risk-sensitive, portfolio-based model.
  - SIMM was developed by ISDA and is the standard IM model for non cleared derivatives.
  - Grid Method: Fixed % of notional by trade type and maturity tenor.
- SIMM preferred by large institutions; Grid used by smaller firms.
- Both methods must meet regulations and apply to eligible counterparties.
- Key IM requirements:
-
  - Posted to segregated third-party custodian.
  - IM calculated at trade inception.
  - IM call triggered if exposure change exceeds MTA.
- Practically recalculated daily for new/amended trades.

Average Aggregate Notional Amount (AANA)

- Definition: Average notional of OTC derivatives positions over a set period.
- Purpose: Checks if a financial institution meets regulatory thresholds (e.g., EMIR, Dodd-Frank).
- Calculation: Average notional of all OTC derivatives contracts over 12 months.
- Regulatory Relevance:
  - Sets margining rules for non-centrally cleared derivatives.
  - Key for capital and reporting compliance.
- Impact:
  - Breaching thresholds enforces clearing, margining, and reporting duties.
  - Helps regulators assess systemic risk in derivatives markets.

UMR Phases and IM Method Requirements - 1

Phase	Effective Date	AANA Threshold	Example Institutions
Phase 1	Sep 2016	$>$ \$3 trillion	JPMorgan, Goldman Sachs, Citibank
Phase 2	Sep 2017	$>$ \$2.25 trillion	Morgan Stanley, BofA, Barclays
Phase 3	Sep 2018	$>$ \$1.5 trillion	HSBC, BNP Paribas, Deutsche Bank
Phase 4	Sep 2019	$>$ \$750 billion	RBC, Nomura, Société Générale
Phase 5	Sep 2021	$>$ \$50 billion	AllianceBernstein, Invesco, Aegon
Phase 6	Sep 2022	$>$ \$8 billion	PGGM, Neuberger Berman, Federated Hermes

- Phases 1–2: Major global dealers (e.g., JPMorgan, Goldman).
- Phases 3–4: Regional dealers and large international banks.
- Phases 5–6: Smaller buy-side firms and asset managers.
- Firms self-assess phase using confidential AANA data; shared with regulators but not publicly disclosed.

UMR Phases and IM Method Requirements - 2

- Phases 1–4: SIMM required; Grid method not allowed.
- Phases 5–6: Grid method allowed if agreed; SIMM optional but standard.
- IM CSA must clearly define margin calculation method.
- IM cannot be netted and must be held in segregated custodian accounts (e.g., BNY, JPM).
- Next, we examine SIMM and Grid methods in detail.

Bilateral OTC Swaps – SIMM Overview - 1

- SIMM is based on portfolio sensitivities to risk factors and risk buckets.
- Sensitivity measures are Delta, Vega and Curvature
  - Delta Sensitivity
    - Change in portfolio value from a 1 basis point move at prescribed tenors (e.g., 2Y, 5Y, 10Y).
    - Captures linear risk across fixed maturity points.
  - Vega Sensitivity
    - Change in value from a shift in implied volatility.
    - Captures exposure to volatility risk in options.
  - Curvature Sensitivity
    - Change in value from large market shocks beyond Delta.
    - Captures non-linear and tail risk.

Bilateral OTC Swaps – SIMM Overview - 2

- Risk asset classes are Rates, FX, Credit, Equity, Commodity.
- Prescribed Tenors for sensitivities in interest rate curves
  - Sensitivities are calculated for fixed tenors (e.g., 1Y, 2Y, 5Y, 10Y for interest rates).
- In-Bucket Correlations
  - Sensitivities within the same currency and risk class are aggregated using tenor-specific correlations.
- Cross-Bucket Correlations
  - Risk across different currencies or asset classes aggregated using lower cross-correlations.
- Algorithmic parallels with FRTB Standardized Approach (SA)[5]

[5] Refer to my FRTB course and lecture 'FRTB SA Sample Calculation for USD/SOFR Interest Rate Swap' for details.

Overview of SIMM Algorithm – 1

1. Identify all relevant risk factors across asset classes:
   - Interest Rates, FX, Credit, Equity, Commodity.
2. Calculate Delta, Vega, and Curvature sensitivities per risk factor and tenor.
3. Assign each sensitivity to the appropriate risk bucket:
   - A risk bucket groups sensitivities by currency and maturity band to aggregate similar risks.
   - Example: mapping sensitivities to risk buckets:

Risk Factor	Currency	Tenor	Risk Bucket (Currency + Maturity)
USD/SOFR 2Y	USD	2Y	USD 2–5Y Bucket
USD/FF 2Y	USD	2Y	USD 2–5Y Bucket
USD/SOFR 5Y	USD	5Y	USD 5–10Y Bucket
EUR/ESTER 2Y	EUR	2Y	EUR 2–5Y Bucket

4. Apply prescribed risk weights to each sensitivity within each risk bucket.

Overview of SIMM Algorithm – 2

5. Aggregate weighted sensitivities within each bucket using prescribed intra-bucket correlations.
6. Aggregate across buckets using cross-bucket correlations where applicable.
7. Apply correlation scenarios:
   - Low, Medium (Base), and High correlation scenarios.
8. Final SIMM Initial Margin = maximum aggregated capital across all correlation scenarios.
9. Algorithmic parallels with FRTB Standardized Approach (SA)[6]

[6] Refer to my FRTB course and lecture 'FRTB SA Sample Calculation for USD/SOFR Interest Rate Swap' for details.

Bilateral OTC Swaps – IM via Grid Method - 1

- Grid Method:
  - Very simple standardized approach for Initial Margin calculation.
  - Portfolio IM is just the sum of the trades IM.
- Predefined 2-dim grid that defines trade IM as % of notional
  - Asset Type
  - Maturity
- Ignores netting, correlations and diversification across positions.
- Conservative, requiring higher collateral.
- Unaffected by portfolio specifics or market changes.

Bilateral OTC Swaps – IM via Grid Method - 2

- Example Grid Values:
  - Interest Rate Swaps

Tenor	Margin (% Notional)
Up to 2 years	1%
2 to 5 years	2%
5 to 10 years	3%
Over 10 years	4%

  - Swaptions

Type	Margin (% Notional)
ATM Swaptions	4%
OTM Swaptions	2%
ITM Swaptions	5%

- Example: A $100M interest rate swap with a 4-year maturity needs a margin of 2%, giving an IM of $2M

Bilateral OTC Swaps – IM Custodian Segregation

- IM must be held with an independent third-party custodian (per UMR rules).
- Custodian account needs:
  - Segregated, non-rehypothecable[7], bankruptcy remote.
  - Dual-account structure: Pledgor/Pledgee (We/They).
- Daily workflow:
  - Run SIMM $\rightarrow$ Calculate IM.
  - Instruct movement via MT542 (Deliver) or triparty API.
  - Custodian confirms receipt and values collateral.
- Failure to post $\rightarrow$ Leads to disputes, reporting, and penalties.

[7] Rehypothecation allows reuse of collateral

Bilateral OTC Swaps – VM Calculation

- Example: 5Y Payer Swap, Notional: \$100M
  - Counterparty has exposure to us in case we default
  - T_0 NPV: -\$800K, T_1 NPV: -\$1.1M
  - Exposure change = -\$300K $\rightarrow$ VM call = \$300K
  - CSA Terms:
    - MTA = \$250K $\rightarrow$ Call triggered
    - Eligible collateral: USD cash or USTs (2% haircut)

Bilateral OTC Swaps – VM Workflow

- EOD market data snapshot $\rightarrow$ Compute NPV, exposure
- Margin call issued via Acadia or similar platform by 9:00am EST (T+1)
- Collateral selection:
  - Extract from eligible inventory
  - Optimize funding costs
  - Avoid concentration/eligibility breaches
- Execute via SWIFT (MT542/543) or custodian API
- Reconcile and confirm by 1:00pm EST to avoid disputes

Outline

Centrally Cleared Derivatives – Overview

- Cleared derivatives: standardized contracts novated to CCP[8].
- Example: 5Y vanilla Fixed vs. SOFR interest rate swap.
- CCP assumes credit risk, ensuring trade integrity.
- Novation and clearing via FCM to CCPs (e.g., LCH, CME, Eurex, ICE).
- Margining: Daily/intraday VM & IM per CCP rulebook.
- Accepted margin types: cash (USD, EUR), USTs, eligible securities.

[8]Was defined on slide 10

Centrally Cleared Derivatives – IM and VM

- FCM and CCP manage all VM and IM flows.
- Minimal disputes as exchanges serve as final arbiters.
- Broker statements often accepted or reconciled with internal models.
- IM: risk-based buffer set by CCP (e.g., VaR, Expected Shortfall).
- Exact IM replication is tough; APIs exist for pre-trade analysis. Methods not fully disclosed to avoid arbitrage.
- Daily VM: full mark-to-market (MTM) changes settled in cash.
- Cleared swaps lack periodic cashflows; replaced by Price Alignment Interest (PAI).[9]

[9] PAI details on next slide.

What PAI Is and Covers – and What It Doesn't

- PAI: Interest on daily VM posted to CCP.
- Removes unintended economic gain/loss from cash VM.
- Based on overnight rate (e.g., SOFR, €STR); applied daily.
- Reflects collateral time value, not swap leg accruals.
- Cleared swaps lack periodic coupons; cashflows replaced by[10]:
  - Daily VM: Settles MTM, incl. accrued interest.
  - PAI: Offsets cost/benefit of cash as VM.
- Fixed/float accruals in MTM $\rightarrow$ settled via VM.

[10] Very clever how CCPs avoid coupon payments via financial engineering to convert coupons into VM+PAI

Daily Workflow for Cleared Margin

- CCP releases margin statement (e.g., LCH Portal) by 6:30am EST.
- FCM debits VM from cash account.
- Initial Margin process:
  - Eligible collateral: USTs, agencies, major currencies.
  - Delivered via FCM or tri-party agent (e.g., BNY, Euroclear).
- Reconcile daily against FCM statement.
- System monitors exposure by CCP, account, and asset type.

Outline

Exchange-Traded Derivatives – Overview

- ETDs: Standardized futures and listed options on organized exchanges (e.g., CME, ICE).
- Existed decades before bilateral and cleared OTC derivatives.
- Examples: Eurodollar futures, S&P/Dow/Nasdaq futures, S&P 500 options, Treasury futures, or Eris swap futures (less common).
- Trades are auto-cleared through the exchange-operated CCP upon execution.[11]
- CCP as central counterparty effectively reduces default risk.

[11] While formally distinct, the exchange and CCP are closely integrated in practice, and the distinction is often treated flexibly.

Exchange-Traded Derivatives – IM and VM

- Responsibilities mirror cleared derivatives.
- Initial Margin:
  - Required upfront to open/maintain positions.
  - Calculated via SPAN[12] or VaR (exchange-specific).
  - Sensitive to volatility and position size.
- Variation Margin:
  - Settled daily in cash (USD/EUR only[13]).
  - Reflects full mark-to-market P&L from prior day's close.
  - Auto-debited from client clearing accounts via FCM.
- CCP informs FCM early morning; FCM updates clients.
- Intraday margin calls possible during high volatility.

[12] see next slide for definition

[13] USD/EUR dominate but local exchanges (e.g., SGX, HKEX) also allow local ccy

SPAN – Exchange Margin Methodology

- SPAN (Standard Portfolio Analysis of Risk): Standard for Initial Margin on futures/options (e.g., CME)
- Assesses worst-case loss across 16 scenarios:
  - Price moves, volatility shifts, correlation breakdowns
  - Includes delta, gamma[14], vega, and cross-margining
- Risk evaluated at portfolio level, not per product
- IM recalibrated daily; scales with volatility
- Offsets allowed for correlated products (e.g., equity index futures and options)
- No offsets across uncorrelated products (e.g., Eris swap futures vs. equity futures)

[14] Called curvature in SIMM and FRTB SA

SPAN Risk Array – Visual Example

Price Change	Volatility	Scenario	Estimated Loss ($)[15]
+5%	Unchanged	Bull Market	-12,000
+5%	+10%	Volatile Bull	-18,000
0%	+20%	Vol Shock	-15,000
-5%	Unchanged	Bear Market	-10,000
-5%	-10%	Calm Bear	-8,000
-10%	+15%	Crash + Vol	-25,000
		Worst-case Scenario	**-25,000**

SPAN Initial Margin = Maximum projected loss across all modeled scenarios.

[15] In the real world some of these scenarios results in gains.

Outline

Repos and Securities Lending – Overview

- Repo: short-term funding trade exchanging cash for securities with a repurchase agreement.
  - Can be used to borrow cash cheaply as it's collateralized.
  - Can be used to borrow/lend securities for cash and pay/receive interest.
- Structure: bilateral (direct) or tri-party (via agent like BNY/JPM).
- Collateralized: lender holds securities; borrower gets cash.
- Daily margining: based on collateral's mark-to-market value.
- Common collateral: USTs, agencies, IG corporates, equities (with haircut applied).
- Margin calls/substitutions managed via custodian or tri-party platform.
- Repos transform ineligible assets into CCP-eligible collateral for IM.

Repos and Securities Lending – IM and VM

- Initial Margin:
  - Not usually needed in standard repos but often included as a haircut (e.g., 2% on USTs, 5–10% on corporates).
  - Haircut serves as a buffer (like IM) to protect cash lender from liquidation losses.
- Variation Margin:
  - Based on daily mark-to-market of collateral vs. cash; safeguards against collateral price drops.
- Margin thresholds and call timing set in repo agreement or triparty schedule.

Use Case: Collateral Transformation via Repo

- Converts ineligible assets (e.g., equities, corporates) into CCP-eligible collateral (e.g., USTs)
- Process:
  1. Post ineligible assets as repo collateral
  2. Receive cash from dealer/triparty agent
  3. Use cash to buy eligible USTs
  4. Post USTs as Initial Margin to CCP
- Boosts funding efficiency; avoids forced liquidation of portfolio assets
- Key factors: maturity alignment, haircuts, eligibility risk, repo recall timing

Triparty Repo Margining

- Daily EOD market valuation by tri-party agent (e.g., JPM, BNY Mellon)
- Margin requirements shared by 6:00 AM EST
- Margin movement:
  - Auto-allocated from eligible collateral pool
  - Substitution allowed based on liquidity/availability
- Tri-party agent duties:
  - Enforces eligibility criteria, applies haircuts
  - Optimizes collateral allocation in the pool
  - Tracks corporate actions on pledged securities
- Reporting available to both parties via secure portal or API

Outline

TBAs and MBS – Overview

- TBAs[16]: Forward-settling trades in agency MBS markets.
- Used by asset managers, insurers, REITs for MBS exposure before pool identification.
- Governed by SIFMA/FINRA; margining required under FINRA Rule 4210.
- Forward structure $\rightarrow$ counterparty risk and therefore margining needed.
- Settled bilaterally (not CCP-cleared) via broker-dealer counterparties.
- Trade is reported to TRACE[17] (Trade Reporting and Compliance Engine) after execution to promote market transparency.
- TRACE is FINRA's platform for mandatory post-trade reporting of bonds and agency MBS trades.

[16] I am an expert in MBS and ABS. If you need a very detailed course please send me a message so I can send you a coupon to my MBS&ABS course on Udemy.

[17] Check out `https://www.finra.org/filing-reporting/trace`

TBAs and MBS – IM and VM

- Initial Margin:
  - FINRA 4210 may require base margin (e.g., 2%) in addition to VM.
  - IM factors:
    - Counterparty type (e.g., exempt accounts, registered funds).
    - Net exposure above thresholds (e.g., $2.5M de minimis).
- Variation Margin:
  - Based on daily mark-to-market vs. agreed forward price.
- Minimum Transfer Amounts: Usually $250K to avoid small payments going back and forth.
- VM settled in USD cash with dealer; governed by agreement timing/thresholds.
- No central clearing: Margin terms differ by counterparty; operational tracking needed per trade.

Margining Process for TBAs

- Trade details (CUSIP, settle date, size) logged at execution.
- Mark-to-market based on TRACE or dealer prices:
  - TRACE reflects executed prices
  - Unlike OTC derivatives MTM, which uses models varying by counterparty.
- FINRA 4210 Margin Rules:
  - Typical Minimum Transfer Amount (MTA): \$250k.
  - Margin = 2% base + daily variation.
  - Base Margin:
    - 2%: For exempt counterparties (e.g., mortgage banks, regulated institutions, broker-dealers, GSEs).
    - 5%: For non-exempt counterparties (e.g., hedge funds, asset managers).
- Daily exposure calculation $\rightarrow$ cash movement to broker.
- Auditable records and reporting to FINRA.

Outline

Collateral Inventory Management

- Centralized, real-time view of available, pledged, and encumbered[18] assets
- Sources: internal position systems, custodians, tri-party agents, clearing brokers
- Key data points: eligibility by CSA/CCP, haircut application, maturity, issuer, currency, liquidity
- Supports margin call fulfillment, collateral substitution, funding optimization, and regulatory compliance
- Critical across asset classes: OTC derivatives, cleared derivatives, repos, MBS forwards, and ETDs

[18] means that it cannot be freely used for collateral

Collateral Settlement Workflow

- Instructions sent via SWIFT MT540–543 or custodian APIs
- Settlement methods: DVP (Delivery vs. Payment) or FOP (Free of Payment)
- Cutoffs vary by custodian, asset type, and time zone
- Affirmation of collateral movements critical to prevent settlement fails
- Same-day settlement for VM; IM and substitutions may follow next-day cycles
- Active monitoring of settlement status, fails, and collateral recalls

Dispute Management and Reconciliation

- Daily portfolio and margin reconciliation required under UMR, EMIR
- Common breaks: MTM differences, collateral disputes, booking mismatches
- Sources: risk systems, counterparty statements, custodians
- Tools: TriResolve (exposure matching), AcadiaSoft (call affirmation), manual spreadsheets
- Workflow: timestamped tracking, dispute codes, SLA-based resolution
- Escalation: ops, legal, front office for aged or material disputes

Outline

Collateral Optimization – Overview

- Goal
  - Minimize funding cost and maximize collateral eligibility and flexibility
- Strategy
  - Apply based on available assets cheapest-to-deliver logic based on haircuts
- Key inputs
  - Eligibility schedules (CSA/CCP), haircut matrices, funding costs, reuse and concentration limits
- Constraints
  - Available collateral, regulatory constraints, internal risk policies, counterparty restrictions, minimize cost
- Output
  - Optimal collateral allocation across counterparties and calls, prioritizing low-cost, high-eligibility assets within defined limits

Collateral Optimization – Funding Efficiency Concept

- Margin calls must consider not only eligibility and haircuts, but also funding cost
- Funding cost is the opportunity cost of using the asset vs. repoing it or holding cash
  - In practice this is the repo rate for securities and borrow rate for cash[19]
- Cheapest-to-deliver collateral is the asset that minimizes overall funding expense while meeting margin requirements
- Objective: balance haircut impact, repo rate, and liquidity needs

[19] Cash earns interest when posting as collateral but less than the borrow rate and usually expensive.

Collateral Optimization Example – Using Existing Bond Positio

- Margin call: $10 million
- Internal unsecured borrowing rate: 6.00%
- SOFR overnight: 1.5%
- Available inventory:

Asset	Repo Rate	Haircut	Effective Coverage	Available Amount	Funding Cost Impact
USTs	3.75%	0%	100%	$6 million	Lowest (preferred)
Corporate Bonds	4.25%	2%	98%	$8 million	Moderate (still cheaper than cash)
Equities	7.00%	15%	85%	$15 million	High (least preferred)

- Fill first $6 million with USTs (full coverage, lowest funding cost).
- Fill remaining $4 million with corporate bonds (after haircut adjustment).
- Avoid equities unless no other choice.
- Avoid cash as 6% borrowing more expensive than corporate bonds even when earning 1.5% interest on cash.

Summary

Thank You!

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Questions?

Roadmap

- Make definitions of the 5 asset classes consistent in format.
- Add SIMM reconciled example but maybe this belongs more to an in-depth lecture.
- Expand on operations section and optimization.
- Mention implications of leverage with collateral. It's not completly free to trade derivatives any more which is a good thing.
- Comment with zoom at the end of asset class coverage to talk about the timing when these asset classes came to market and how collateral differs - futures first, then repos and tbas and then swaps. bi-lateral still custom just bi-lateral ...