The Good, The Bad, and The Ugly: Liquidity Risk in the $27 Trillion Credit Derivatives Market

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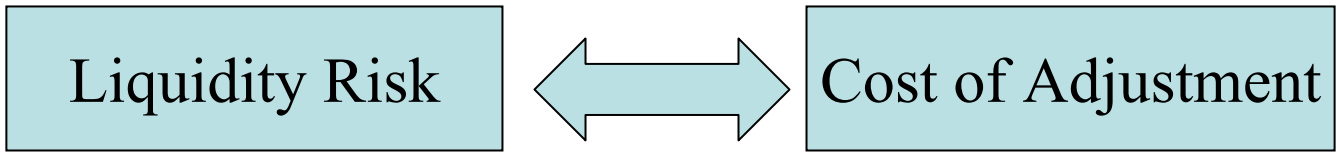
Fundamental Principle



Material Implications For Funding and Asset Risk

Rebalancing

Negative Convexity

Gamma

“The Good”

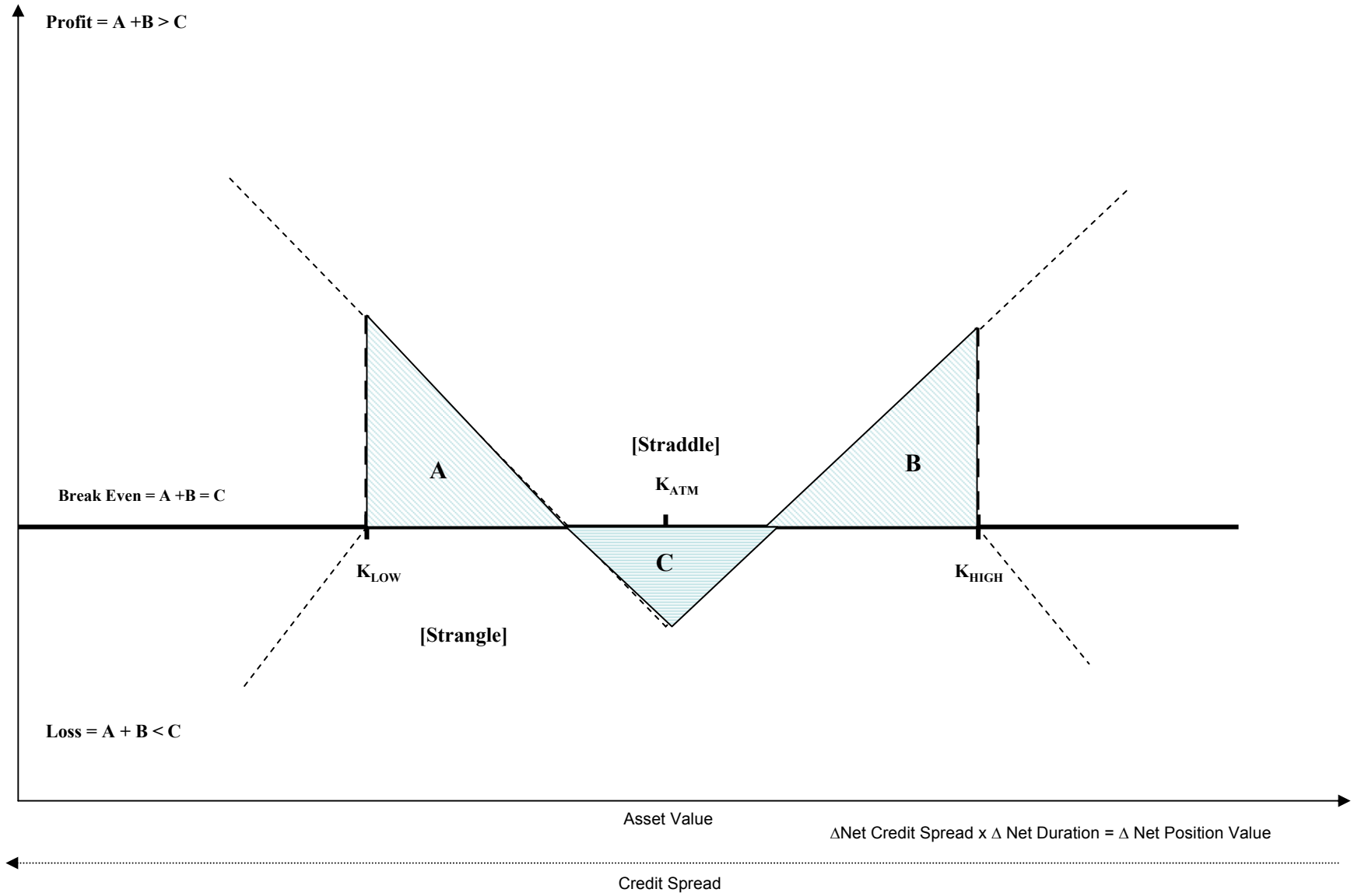
- Enhanced Volume, Price Transparency and Liquidity
  - “Pure play”
    - More Efficient Shorts
    - Synthetic Issuance

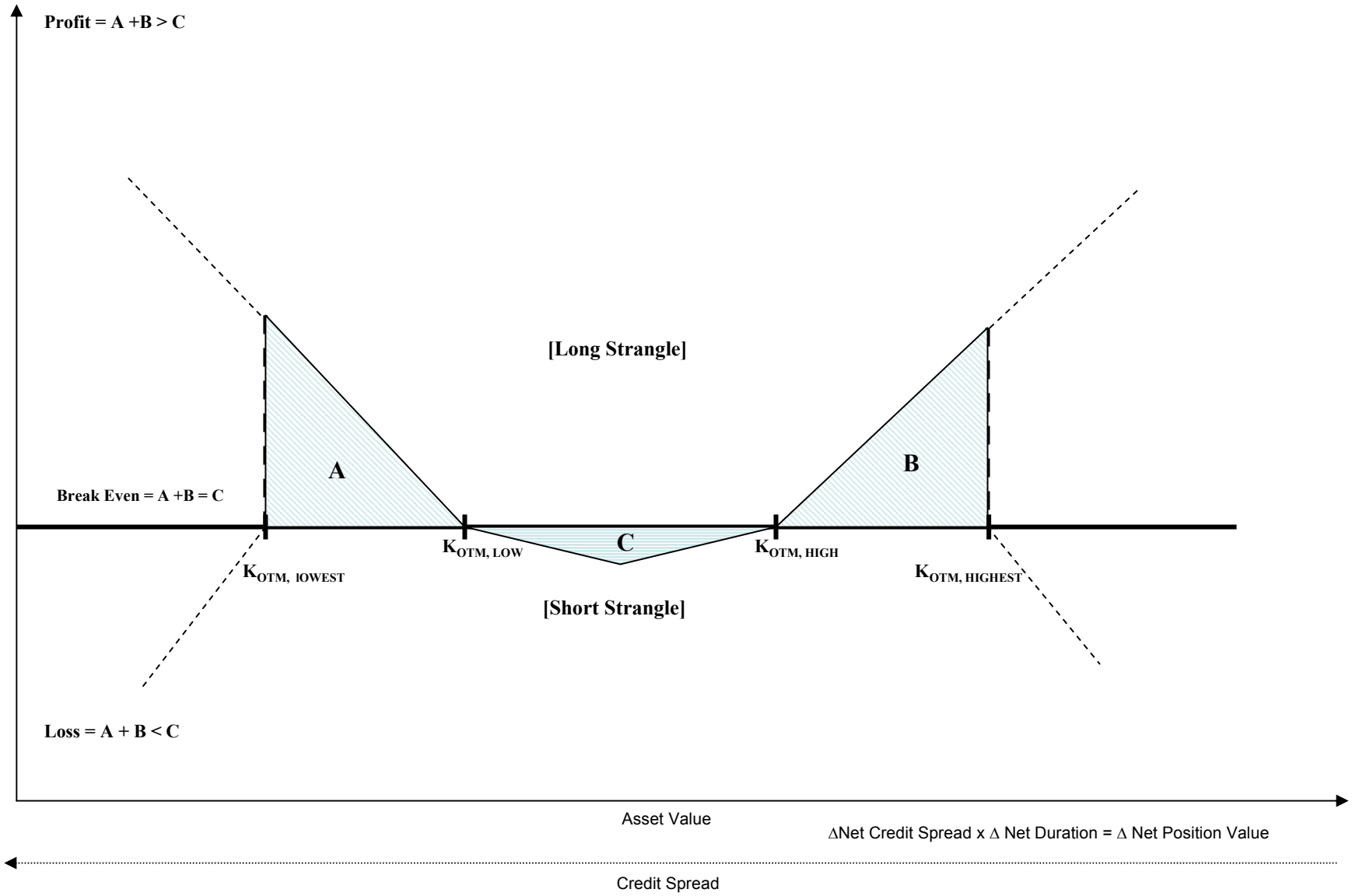
“The Bad”

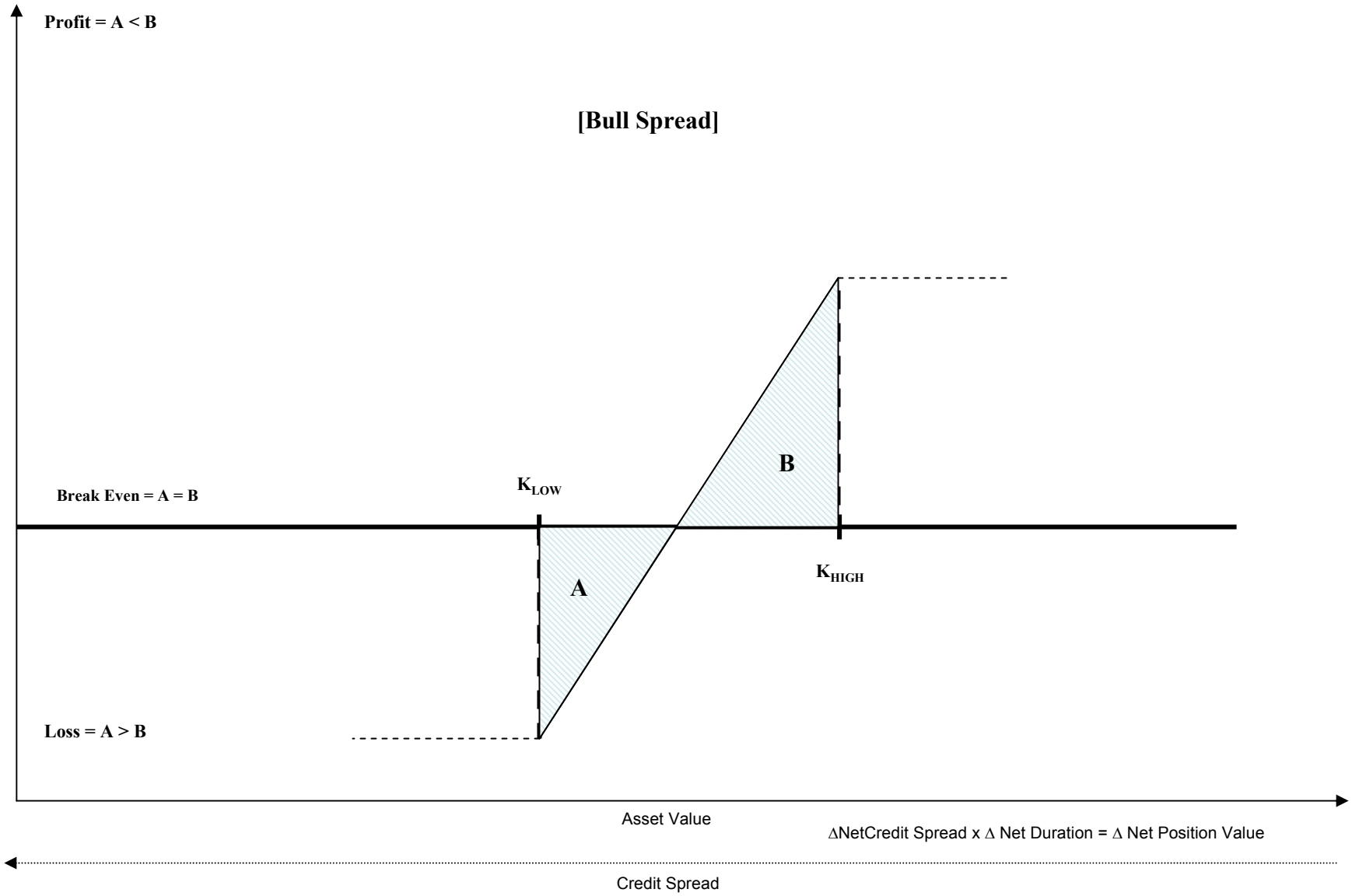
- Contagion Effects
  - Coordination Failures
  - Information Cascades
  - Misaligned Incentives/Agency Problems (Governance)
    - Predatory Trading
  - Mkt (micro-)structure issues
    - Collateral squeezes
  - "Model Risk“
  - Liquidity BlackHoles?
  - Contractual and Operational Considerations

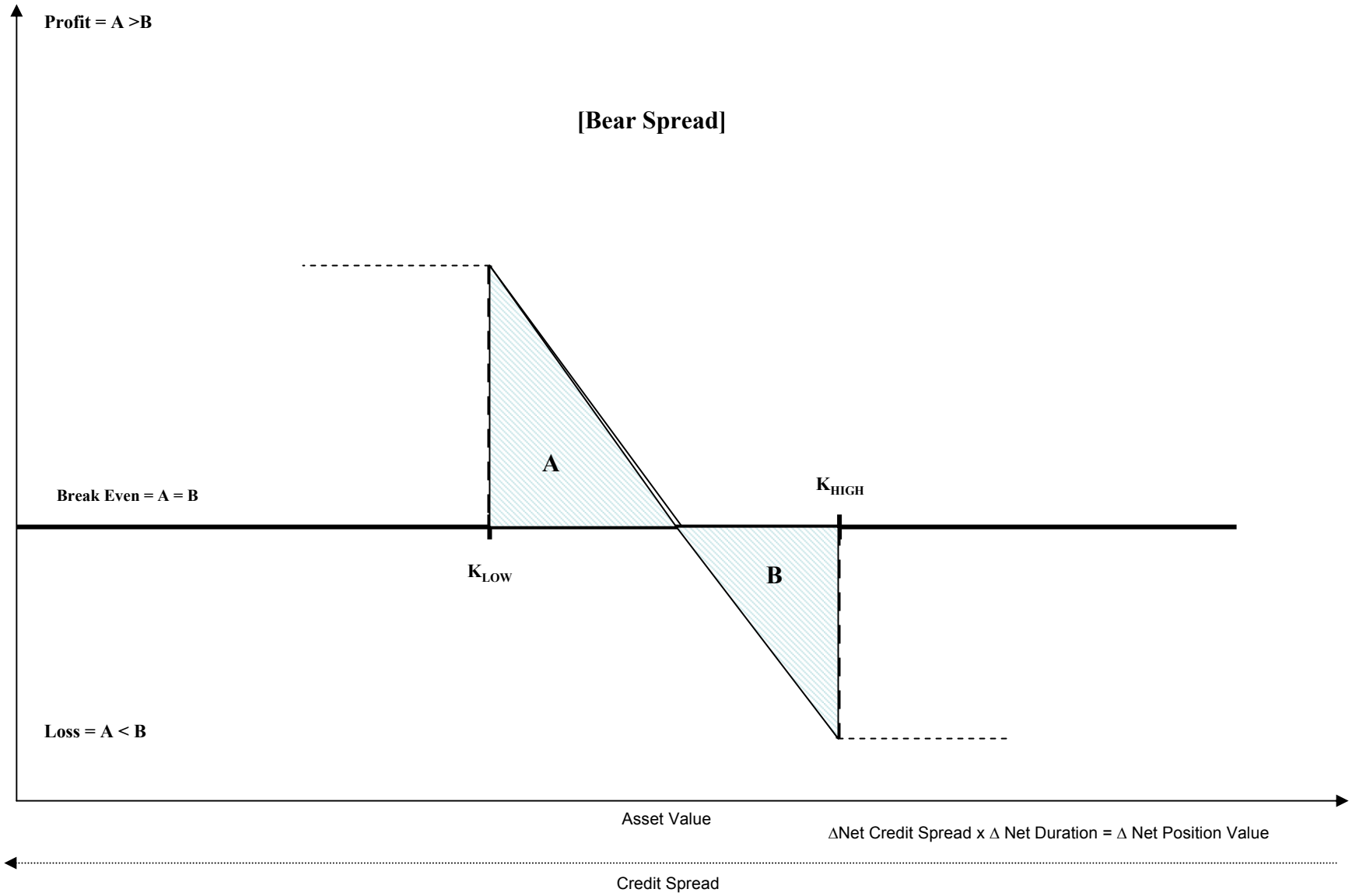
“The Ugly”

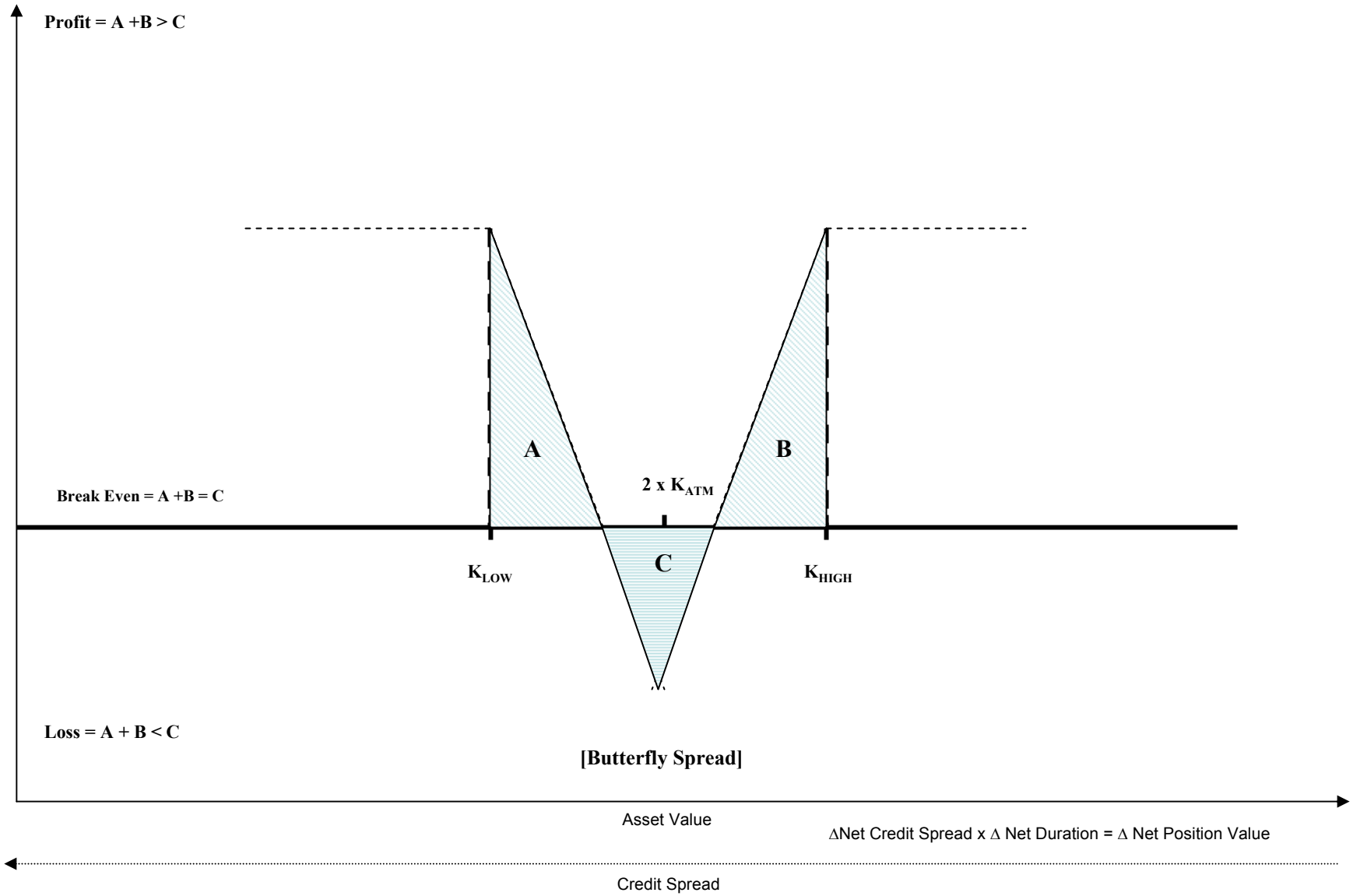
- Speculative Dynamics and Carry
  - Path- and State- Dependence
  - Short vs Long Horizon
  - Fundamentals vs Spread Technicals
  - Market Sentiment in Risk Premia
  - Complex Cross-Correlations
    - Collateral Amplification (Feedback) ⇔ Expansion/Contraction
    - Severity of Credit Contraction
- Long Carry? Then where am I “short”?


Profit = A +B > C
[Straddle]
A
B
Break Even = A +B = C
K_ATM
C
K_LOW
K_HIGH
[Strangle]
Loss = A + B < C
Asset Value
ΔNet Credit Spread x Δ Net Duration = Δ Net Position Value
Credit Spread


Profit = A +B > C
[Long Strangle]
A
B
Break Even = A +B = C
C
$K_{OTM,\ LOW}$
$K_{OTM,\ HIGH}$
$K_{OTM,\ lOWEST}$
$K_{OTM,\ HIGHEST}$
[Short Strangle]
Loss = A + B < C
Asset Value
ΔNet Credit Spread x Δ Net Duration = Δ Net Position Value
Credit Spread


Profit = A < B
[Bull Spread]
B
Break Even = A = B
K LOW
K HIGH
A
Loss = A > B
Asset Value
ΔNetCredit Spread x Δ Net Duration = Δ Net Position Value
Credit Spread

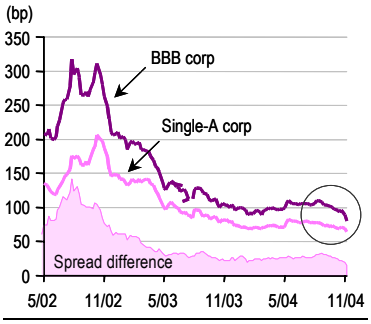

Profit = A >B
[Bear Spread]
A
Break Even = A = B
K_{HIGH}
K_{LOW}
B
Loss = A < B
Asset Value
ΔNet Credit Spread x Δ Net Duration = Δ Net Position Value
Credit Spread


Profit = A +B > C
A
B
2 x K_ATM
Break Even = A +B = C
K_LOW
C
K_HIGH
Loss = A + B < C
[Butterfly Spread]
Asset Value
ΔNet Credit Spread x Δ Net Duration = Δ Net Position Value
Credit Spread

3. First-to-default structure:

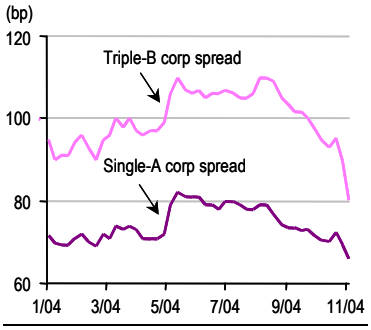
Add spread via leveraged, high-quality exposure

Figure 8a: Spread compression trend over the past 2½ years



Source: UBS

Figure 8b: YTD compression trend



Source: UBS

The powerful move tighter during the recent leg of the year-to-date spread rally leaves the search for significant spread among investment-grade credits quite unrewarding. In the current environment of tight spreads and reduced pickups for moving down in quality (ongoing spread compression, Figure 8a and 8b, next page), **first-to-default, credit-linked notes represent an effective alternative source of added spread,** in our view. Instead of reaching for yield by moving down in quality or out the curve, the FTD structure can achieve high spreads via leveraged exposure to a basket of solid, high-quality credits.

Long exposure (*selling* FTD default protection) amounts to both a credit view and a correlation view (higher offer spread if lower implied correlation). If the corporate market were to suffer a significant setback, higher-quality names likely will outperform, with the brunt of widening biased to be concentrated among lower-quality, higher-beta names as spread compression starts to unwind.

Figure 9 illustrates an FTD note with an underlying basket of five higher-quality credits (single-A and better): Eli Lilly (Aa3/AA), International Lease Finance (A1/AA–), Kohl's (A3/A–), Textron Finance (A3/A–), and Kraft (A3/BBB+). By choosing a diverse credit basket (low correlation), this FTD basket results in a 120-bp LIBOR spread, achieving **81%** (+120 bp/+148 bp) of a fully-leveraged position of equal exposure to each of the five credits, while taking on only **20%** ($10mm/$50mm) of the total notional risk.

Additionally, investors may want to consider adding a protection-overlay hedge by buying CDS on select higher-beta, lower-rated credits. Figure 9 also details that buying protection on a high-beta basket of low-BBB/crossover credits costs an average of 59 bp. The combination of FTD and a protection overlay would still then result in a net +61 bp of LIBOR spread.

Figure 9: Spread through structure: First-to-default (FTD) basket of solid, high-quality credits provides +120 bp (81% of full leverage via selling CDS). Adding a default-protection overlay of higher-beta CDS still leaves +61 bp of LIBOR spread

FTD basket vs. both cash basket and CDS leverage					— Protection overlay			= Result
		LIBOR spread						
Single-A basket Issuer	Rating	First-to-default	Cash basket	Leverage by selling CDS	Higher-beta hedge basket	Rating	Buy CDS (offer)	
Eli Lilly	Aa3/AA		–9	25	Arrow Electronics	Baa3/BBB–	**70**	
Intl Lease Finance	A1/AA–		+22	34	Harrah's	Baa3/BBB–	**70**	
Kohl's	A3/A–		+36	31	Amerada Hess	Ba1/BBB–	**64**	
Textron Finance	A3/A–		+30	28	Phelps Dodge	Baa3/BBB–	**47**	
Kraft	A3/BBB+		+21	30	Sprint	Baa3/BBB–	**45**	
	LIBOR spread (bp):	**+120**	+20	+148		**Average:**	**59**	**+61**
	Notational ($000s):	10,000	10,000	*50,000*			10,000	

Source: UBS

10Yr 8%Cpn Bond Price	Bond-Implied CDS Premium*	Z-Spread**	I-Spread***	Market CDS Premium
85	616	561	559	600
100	322	319	314	322
115	115	120	112	117

Source: Bear Stearns

*Assumes Flat CDS Curve (and either a recovery assumption or arb-free pricing for default curve payoff assumption)

**Zero Vol OAS Curve

***Bond yield-Interpolated Swap Rate

At par (100): Bond-implied CDS premium indicates ***fairly-valued bond*** relative to CDS market premium
(vs. Z-spread and I-spread which both indicate that the bond is slightly (***3-8bp***) ***rich***)

At discount (85):Bond-implied CDS premium indicates bond is ***16bp cheap*** relative to CDS market premium
(vs. Z-spread and I-spread which both indicate that the bond is approximately ***40bp rich***)

At premium (115):Bond-implied CDS premium indicates that the bond is only ***2bp rich*** relative to CDS market premium
(vs. Z-spread and I-spread which indicate that the bond is ***3bp cheap*** and ***5bp rich***, respectively)

The Notion of *Carry* and the *Limits of Arbitrage*

- A theoretical construct related to (risky) arbitrage in the Shleifer Vishny (1997) sense
  - A cost (or benefit) derived from excess supply or excess demand (i.e. *Dead Weight Loss*)
  - Converse of *Convenience Yield*
  - An option premium for a costly to replication option
    - In the model the speed of convergence is analogous to time decay of an option)
- For a (delta-) hedged position: positive carry ⇔ negative convexity
  - "Short (vs. Long) the "tails" of the underlying reference factor
  - Both *State-Dependent* and *Path-Dependent*

The Notion of *Carry* and the *Limits of Arbitrage* (cont'd)

- An agent-specific notionof funding externalities
  - World where N (number of players) is large, N^m (number of bilateral funding relationships) is much larger, and thus access to financing drives trading decisions due to transaction costs derived from computational complexity within a search and matching market
  - A game theoretic approach to funding externalities (iterated elimination of dominated strategies)
  - Funding externality is analogous to the *Coase Conjecture*
  - Also, *Coase Theorem* (Coordination Failure)
- *Market Contestability* ensures that market price = fundamentals, BUT only when entry and exit is costless
  - No funding cost: $C_f=0$ <=> No Price Deviation
  - Funding cost $C_f>0$ <=> Price Deviation is Persistent and Significant
- Notion of "slackness" between market price of asset and its fundamentals
  - In practice, presupposes a borrowing and lending market for asset

The Notion of *Carry* and the *Limits of Arbitrage* (cont'd)

- In the model, carry relates to notions of *specialness* and *rebate* commonly employed employed in the repo markets (also backwardation and contango in the futures markets)
- Although the model cites the *yen carry trade* as an illustrative example (where shocks distributed $N(\mu,\sigma)$ with known parameters), these dynamics apply to all over-the-counter markets (e.g., *variance contract* or *CDS contract),* but in practice where nonstationarity, kurtosis and skewness exist
- In the model, ε relates to both an option delta and/or an *elasticity* $1/\varepsilon$ between price and fundamental value
  - An adjustment cost (*short gamma*) related to the magnitude of *Dead Weight Loss* (excess supply or demand, <u>but of what</u>?)
  - Choosing to an allocation (fixing strategy) is analogous to purchasing a durable good in the *Coase Conjecture*

Key Themes

- Dealer Funding
- Attempts to operationalize the notion of *Risk Aversion*
  - Asset (il-)liquidity vs. Funding (il-)liquidity
  - How endogenous margin act as binding financial constraints
- Margins shield financiers from '***default risk***'
- Arrival process for complementary customers
- "*Fundamental volatility*"
- Joint Hypothesis Problem Related to Shocks
  - (Fundamentals or Excess Supply?)
- Illiquidity => more illiquidity => reduces debt capacity
- Losses increase leverage => reduces debt capacity

Trade Off: Funding Constraints vs. Gains/Losses

Margin Function: (σ,Λ)

Gains/Losses: x_0

One-Period Model: *RN* Dealers maximize x_0

Multi-Period Model: *VaR* includes stochastic arrival of "complementary" customers

Information Asymmetry: Stochastic Liabilities

Three Dates = *1, 2, 3*

Agents Randomly Arrive *Shock May Occur* *Value Realized*

|----------|----------|

Date 1 *Date 2* *Date 3*

$$\pi_i = \Sigma_t \, \delta_t \, \phi_t(x) - \kappa(I, \sigma_\delta)$$

Two Types: $[I^+, I^-]$ …*observed upon arrival*

Two Types: $[\theta_\ell, \theta_s]$ …*revealed if shock occurs*

Poisson Distributed Arrivals: Shocks; Customers