

# **“Model Based Trading in the Real World”**

Thierry F. Bollier

Presentation to Derivatives 2007: New Ideas, New Instruments, New Markets

Special thanks to Dimitri Raevsky (HSBC) for valuable inputs and discussion

# **Beyond models: Challenges of Market Neutral Quantitative Investment Strategies**

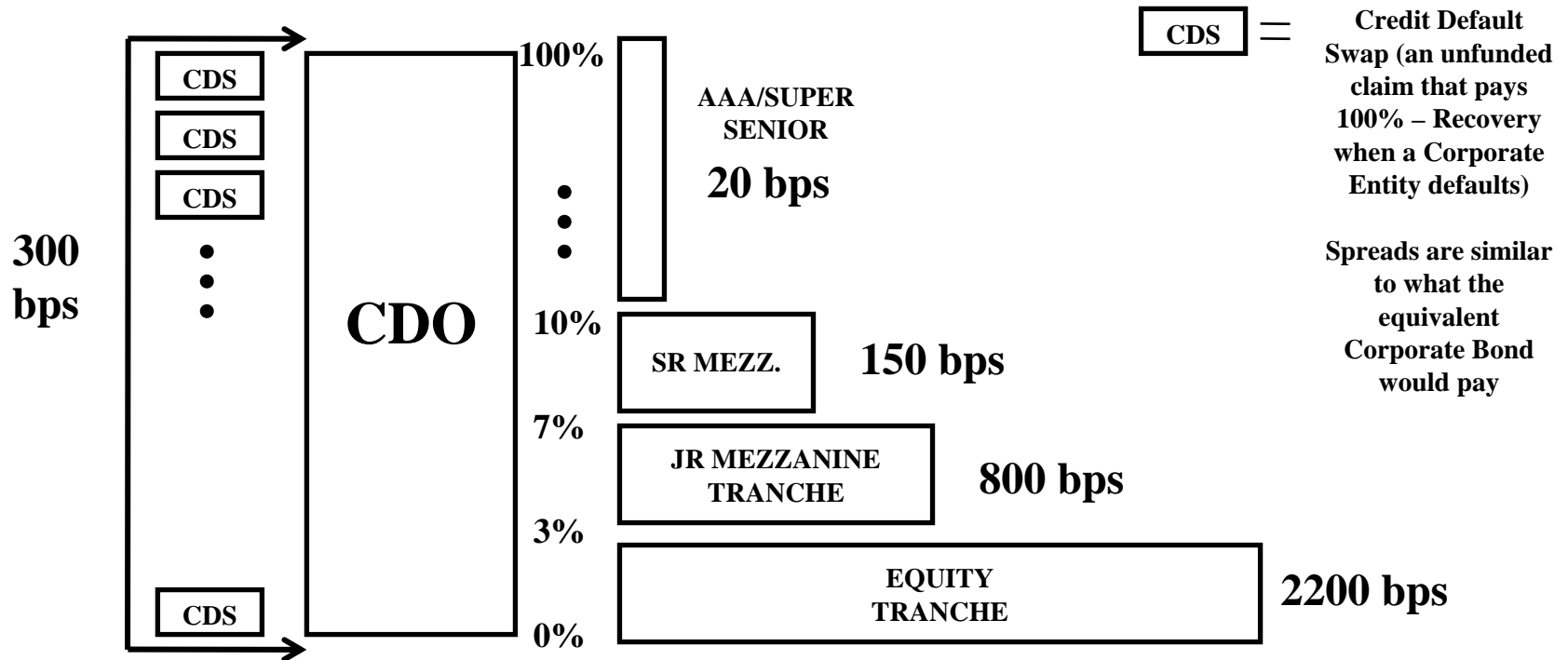
- Need to balance strategies between “normal” risk periods and “extreme” market conditions
- Cost of a market breakdown often comes from having to reduce risk at the wrong time
- Alternative investors should pay attention to the source of funding in considering market arbitrage opportunities

# Example: Market Neutral Strategies in Synthetic Credit Markets

- Explosive growth of credit derivatives market
  - Index and single name credit derivatives markets; liquid credits, high yield, and investment grade
  - Several instruments to equilibrate across market segments
  - Ability to short risk to term (i.e. no physical securities)
  - Ability to take curve positions easily and at low cost
  - Standardization of terms, instruments and default settlement
  - Liquid markets in volatility/correlation
- Increased transparency and liquidity in bond and CDS markets
  - NASD TRACE
  - Online trading platforms (Market Axess/TradeWeb)
  - Large and growing CDS dealer and broker communities motivated to further improve liquidity and transparency
- Developed liquid indices, index tranches and index options
- Models and Risk Systems can be developed to look at Relative value/Statistical Arbitrage across names, tranches and curves

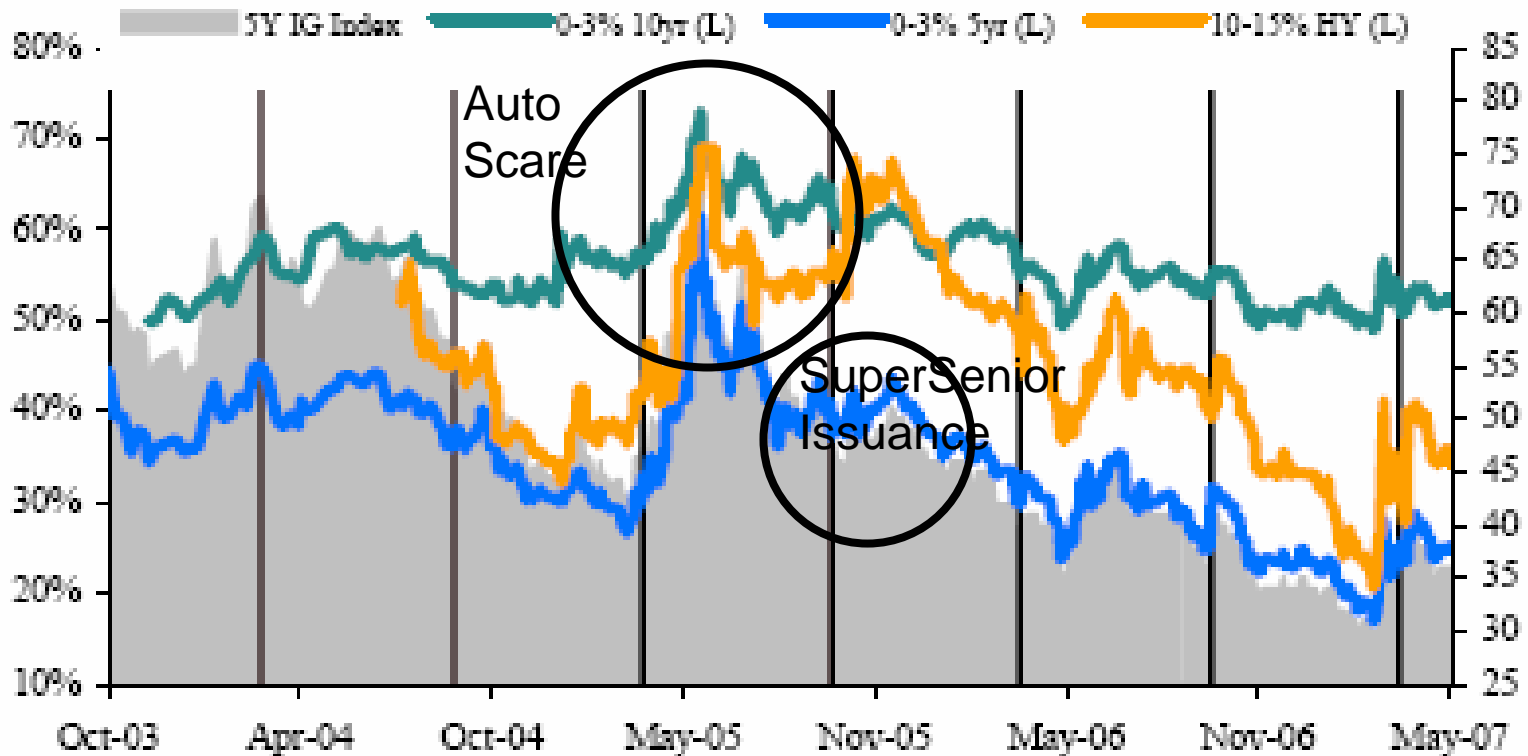
# Synthetic CDO Markets

Sample Synthetic CDO Structure



- In this example, the EQUITY TRANCHE will absorb the first 3% of losses in the CDS portfolio, i.e. their principal will amortize in proportion to the losses they incur. In exchange, they receive 2200bps on their current principal balance for the life of the trade.
- Once the EQUITY TRANCHE is exhausted, the JR MEZZ then begins to amortize with losses. This process continues onto the SR MEZZ and AAA/SUPER SENIOR.
- Since Credit Default Swaps are unfunded instruments, losses are paid at time of default.

# Cheapening of Equity Tranches



# Risk Allocation of Tranches

(Tranche Expected Loss/Index Expected Loss – May 03, 2007)

## Risk Allocation

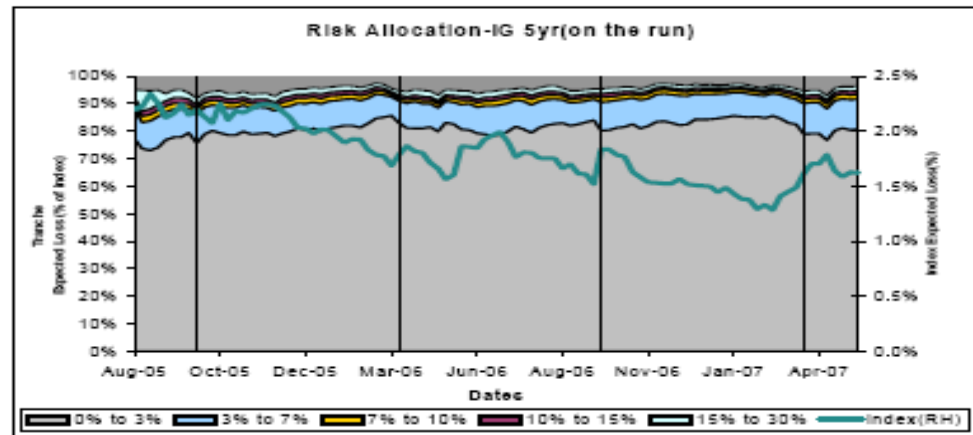
CDX IG8	5yr	7yr	10yr	CDX HY8	3yr
<i>Index*</i>	1.6%	2.8%	4.8%	<i>Index*</i>	5.0%
0-3%	80.8%	65.9%	46.6%	0-10%	87%
3-7%	10.9%	18.7%	29.2%	10-15%	7%
7-10%	1.8%	3.1%	6.1%	15-25%	2%
10-15%	1.3%	2.5%	4.9%	25-35%	0%
15-30%	1.6%	2.9%	4.8%	35-100%	0%
30-100% **	3.6%	6.8%	3.3%		

Risk Allocation of Tranches: Tranche Expected Loss/Index Expected Loss

\* Expected Loss implied by current spreads/prices in a risk neutral sense

\*\* Implied Expected Loss

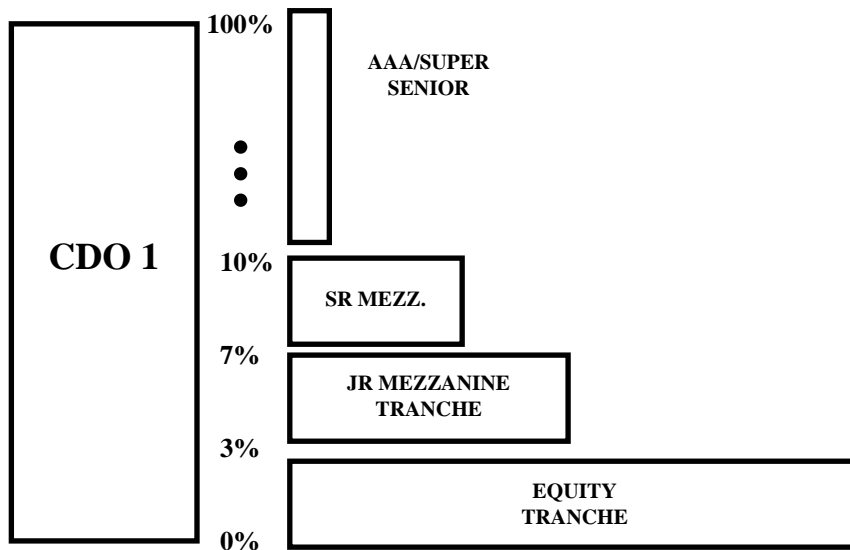
# See Computational methodologies at the end of the document.



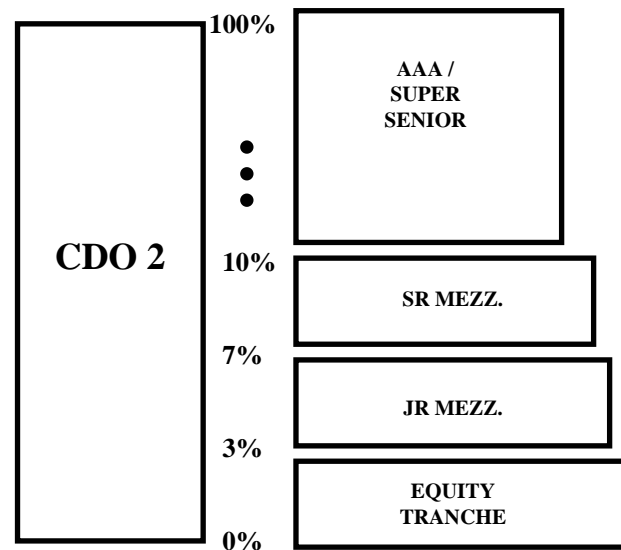
Source: Morgan Stanley

# Credit Correlation Markets

Correlation ~ 0% (low)

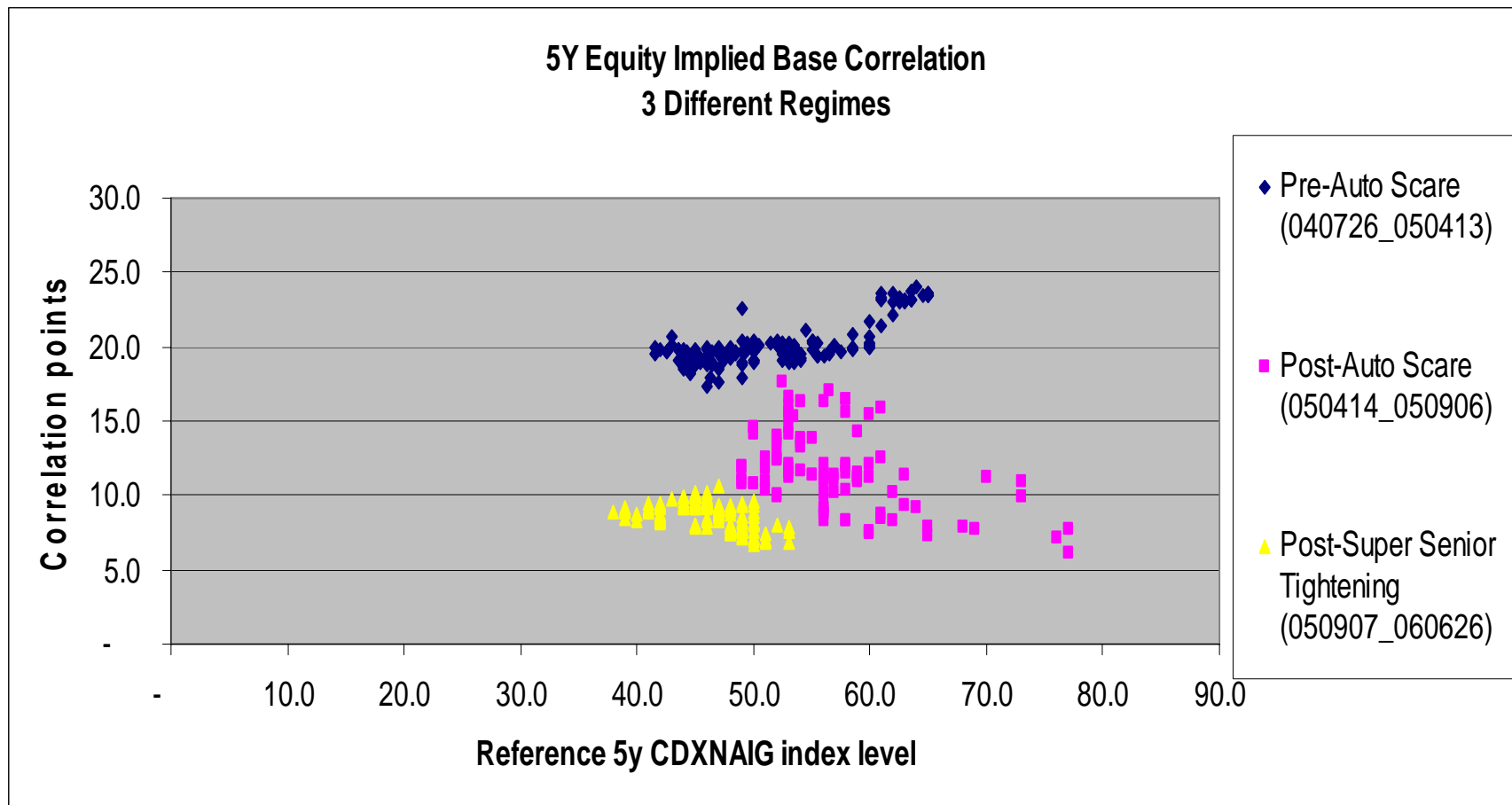


Correlation ~ 100% (high)



- One way to describe the distribution of the CDO asset spreads to the various liabilities is to use a Credit Correlation metric. (This metric is used through the Dealer community)
- When Correlation is low, corporate default probabilities can be seen as independent of each other, leading to the equity tranche absorbing most of the losses.
- When Correlation is high, the likelihood of all the assets defaulting together is higher (as if they were close to being a single asset). Here the mezzanine and super senior spreads approach that of the equity because they have close to the same risk.

# Supply/demand shocks in 2005 changed the relative pricing of Equities tranches





# Balancing strategies between “normal” risk periods and “extreme” market conditions

- Mean reversion model based strategies are available in “normal” periods
- “Plan for everything that can go wrong” -- Sizing the risk of liquidity or structural supply/demand shifts is critical
- Sizing the trade accordingly/not being too greedy in “normal” times
- “Market Neutral” involves a mix of factor hedging (model/normal times) and “shock protection” strategies (build into the strategy extra convexity and insurance) \_\_ “Turn this frown upside down, boy!”
- Diversification to reduce specific shock risks (look across many underlying asset classes: index, bespoke, cash CDOs, HY, loans, receivables, Film financing, ...)
- Multi-strat portfolios
- Being patient in “normal” times, mighty return will involve the full “liquidity cycle”

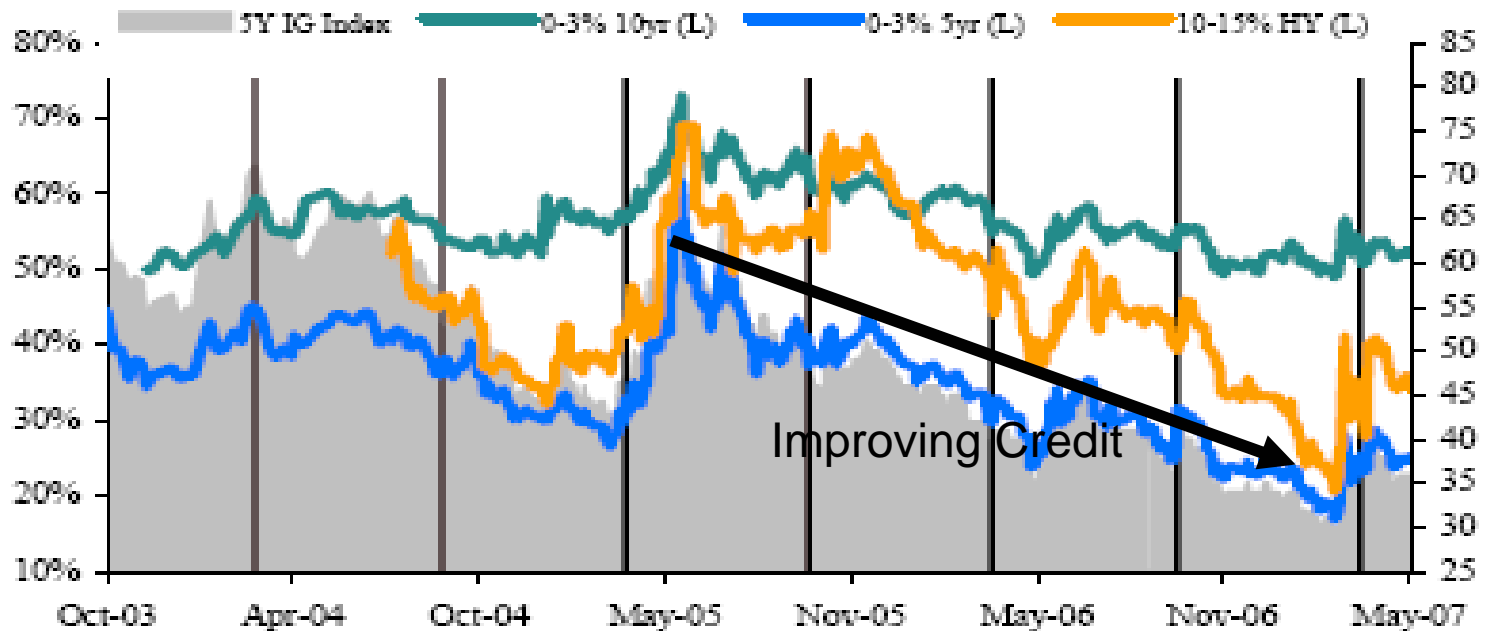
# Within a single asset class, size and diversification considerations could lead to adopting a mix of trades as in this example:

	Tranches RV	Inter-Index RV	Credit Stat Arb: Intra Index, Inter Credit
Instrument	Tranches, Options	Liquid Indices	Index, Liquid CDS
Trades	<ul style="list-style-type: none"> <li>• Tranches</li> <li>• Indices</li> <li>• Index Options</li> </ul>	<ul style="list-style-type: none"> <li>• Index vs. sub Index</li> </ul>	<ul style="list-style-type: none"> <li>• Basis</li> <li>• Sectors</li> </ul>
Holding Period	1-2 months	10-30 days	10-30 days
Holding Period Target Return on Capital	15-20%	3-5%	2-3%
Return Generator	Spread movement, price volatility and correlation technicals	Spread movement due to technicals	Spread movements, technicals, mis-pricing of dispersion
Percent of Capital Allocated	Initially 40-50%	Initially 15-20%	Initially 20-30%

Cost of a market breakdown often comes from  
having to reduce risk at the wrong time

- Ability to maintain a “delta 1” investment or even increasing exposure in the face of a liquidity shock
- Keeping “powder dry” and not being invested in some of the multi-strat areas allows opportunistic investments at the right time
- Liquidity and source of funding

# Is Synthetic Equity Cheap?



Low correlation implies high equity “delta”: before May 05, a market neutral equity strategy would require buying 50% protection per name –3 defaults and a 10 bps average spread widening for the other names would breakeven– ; today the hedge ratio is more like 75% - reducing carry and arbitrage profits .... But is this ratio too much protection? The Market has not really tested the hedge ratio except for small marked to market movements in a rallying spread environment.

# Solution: Equity Funds ?

- High level of Marked-to-market risks unrelated to change in fundamental economic or model data
- Long lock ups ; remove the discretion of investors taking money out before horizon of the trade
- Capital Guarantee Structures
- Exchange traded closed end funds

## Alternative investors should pay attention to the source of funding in considering investment opportunities

- Structured credit opportunities are typically illiquid and subject to supply/demand shocks ;
- Roughly they break down into 3 categories: unrated highly illiquid equity, mezzanine tranches, AAA/Super Senior securities ; all can be traded long or short, held on a market-neutral or outright basis ;
- Multi-strat 3 month liquidity HFs are not the most optimal investment conduits
- Strategies can target specific investor classes (rich or cheap)
- Moreover business model can involve designing “investor solutions” and opportunistic vehicles

# Structured Fund Derivatives can help access sticky capital

- Need to think at both sides of the balance sheet
- Capital guarantee structures are typically long term (5, 7 or 10y);
- Can apply to a strategy, single fund or FoFs
- Ancillary benefits for the investor: reg capital treatment, independent risk monitoring, ...
- Optimized structure can provide a “delta 1” source of capital over a wide range of outcome; divestment is based on known algorithm and removes the element of discretion and surprise
- Other “investor solutions” can help access sticky capital (e.g., transparency) – need to build in flexibility in the infrastructure of the Fund (bespoke solution instead of single flag ship fund)