Do Leveraged Credit Derivatives Modify Credit Allocation ?

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CRÉDIT AGRICOLE ASSET MANAGEMENT

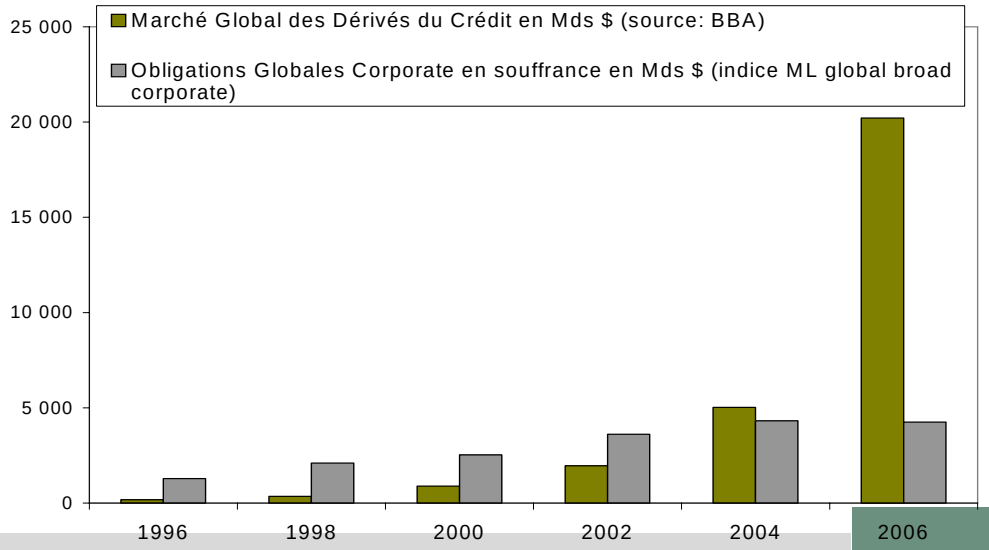
Introduction

Exponential expansion of credit derivatives markets

- The fastest growing part of the global financial derivatives

Driven by :

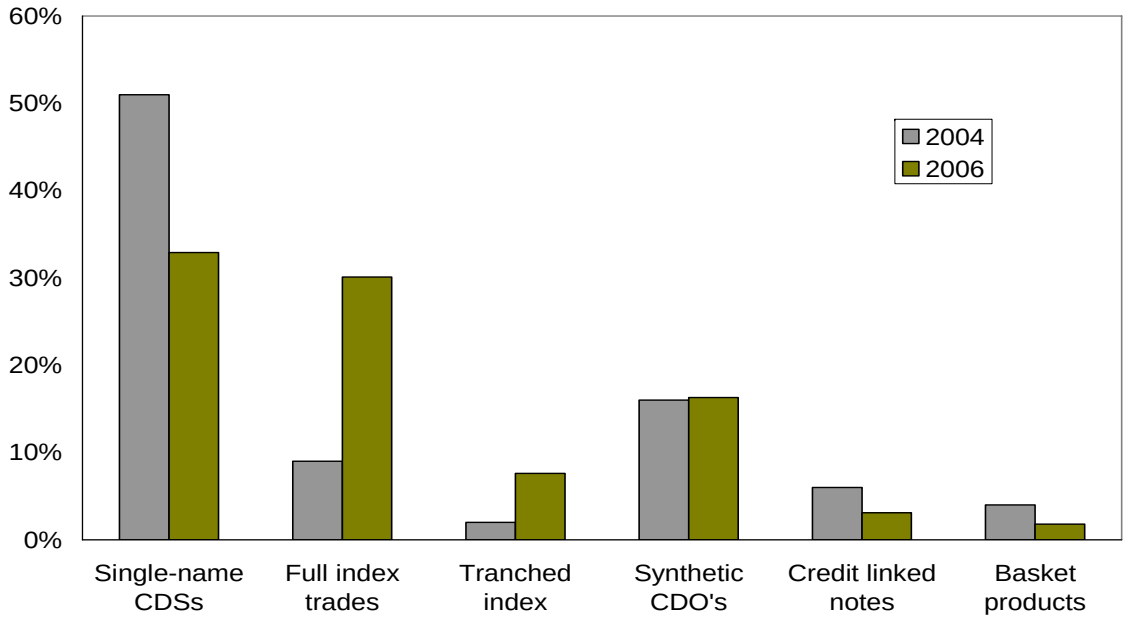
- Need of higher yielding investments in a context of low yields
- Need of hedging or gaining exposure to credit without funding
- Strong interest by some market participants in leveraging



Introduction

A strong product innovation

- Initial growth began with single names CDS market
- Development of synthetic CDO, index tranches, CDO² (CDO of CDO), CPPI, CPDO…



Introduction

Our questions :

- Does this new “asset class” change the strategic global allocation for an asset manager ?
  - **What happens if we replace the investment in traditional corporate bonds in credit derivatives ?**
- How much should be invested in this new asset class ?
- How much should we optimally leverage this asset class ?

Methodology

- This work:
  - **Builds efficient frontiers in a mean/variance framework**
    - based on long term assumptions on expected returns and covarariances
  - **Compares efficient frontiers**
    - traditional corporate bonds (IG and HY) or credit derivatives
    - with different degrees of leverage

- The analysis requires long samples on all asset classes
  - **Credit derivatives : analysis of CDS market (deepest)**
  - **CDS indices begin in 2004**
  - **Approximation to recover a “simulated” longer history**

Methodology

Approximation of CDS returns

A CDS is an agreement between 2 parties to exchange credit risk of a reference entity

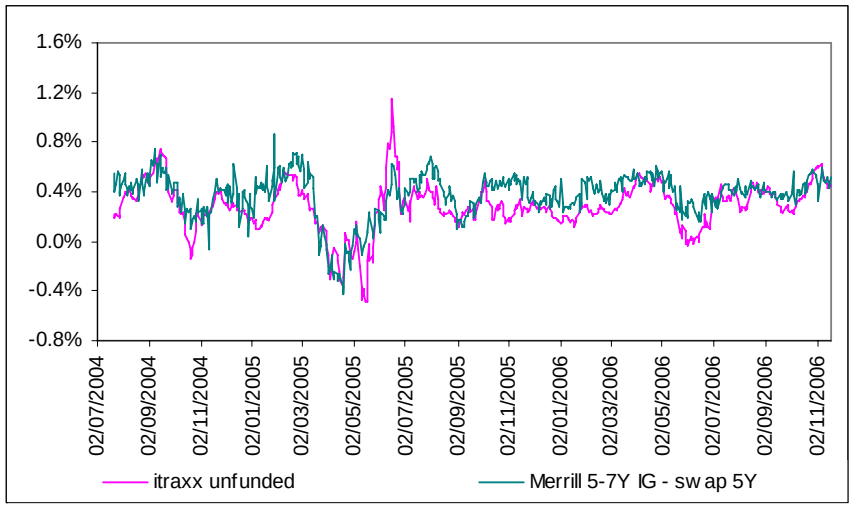
- The seller of a CDS sells protection
- He receives periodic fee if the credit of the reference stable or improves
- He pays a compensation to the buyer in case of credit event

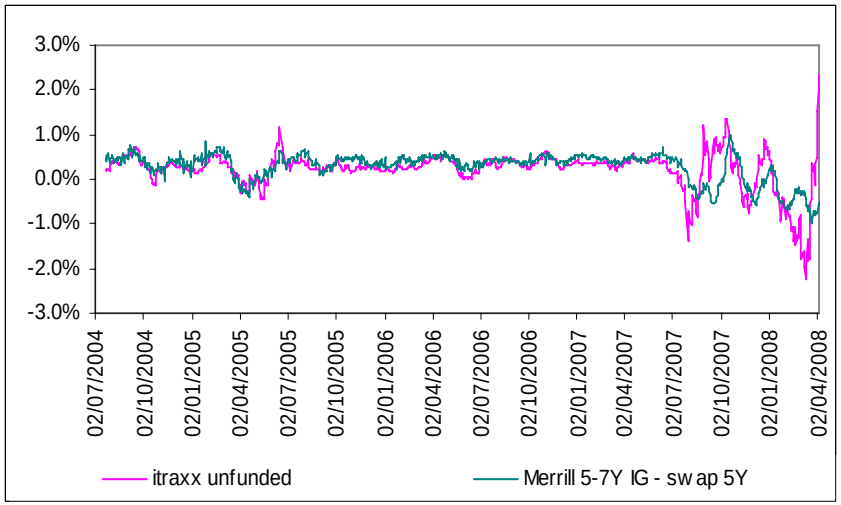
CDS premium approximated by the bond credit spread over swap

- Theoretically, funding at libor, buying protection through CDS and entering an asset swap is fully hedged in any state of the world (Hjort et al. (2002))
- In practice, difference between the 2 : the “basis” (De Wit (2006))
- Relatively good approximation to use the credit spread
  - cf empirical tests : Blanco, Brennan and Marsh (2003), Houweling and Vorst (2002), Hull, Predescu and White (2004)

Methodology

- **This was true before the Subprime crisis !**
  - **CDS monthly returns (iTraxx, source JPMorgan)**
  - **Corporate bond – swap rate +3M cash rate monthly returns**

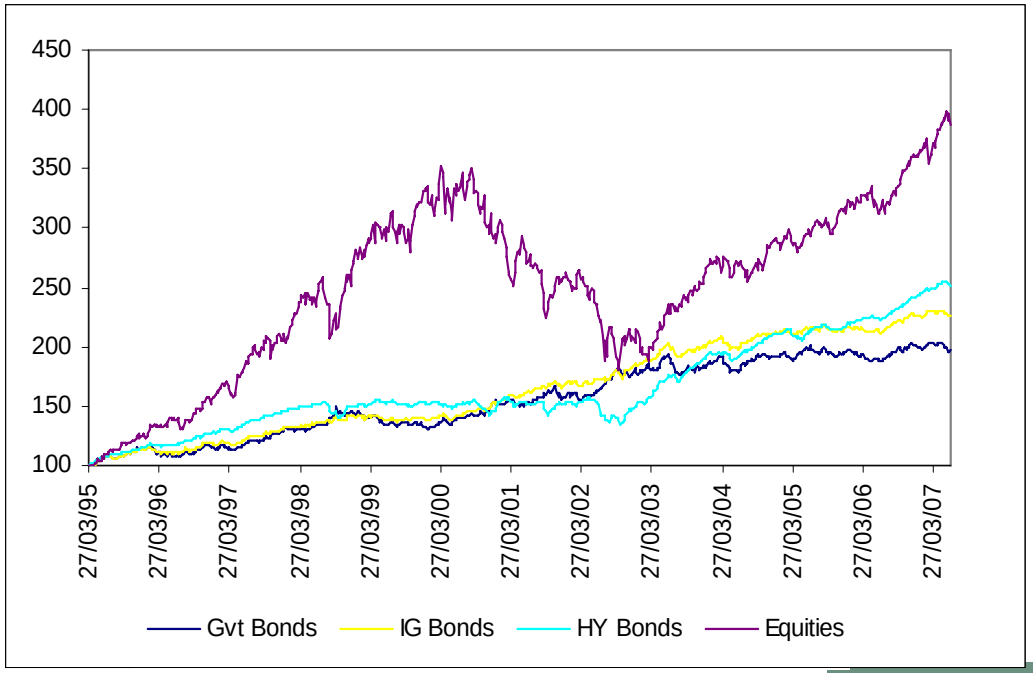




Data

Traditional asset classes returns

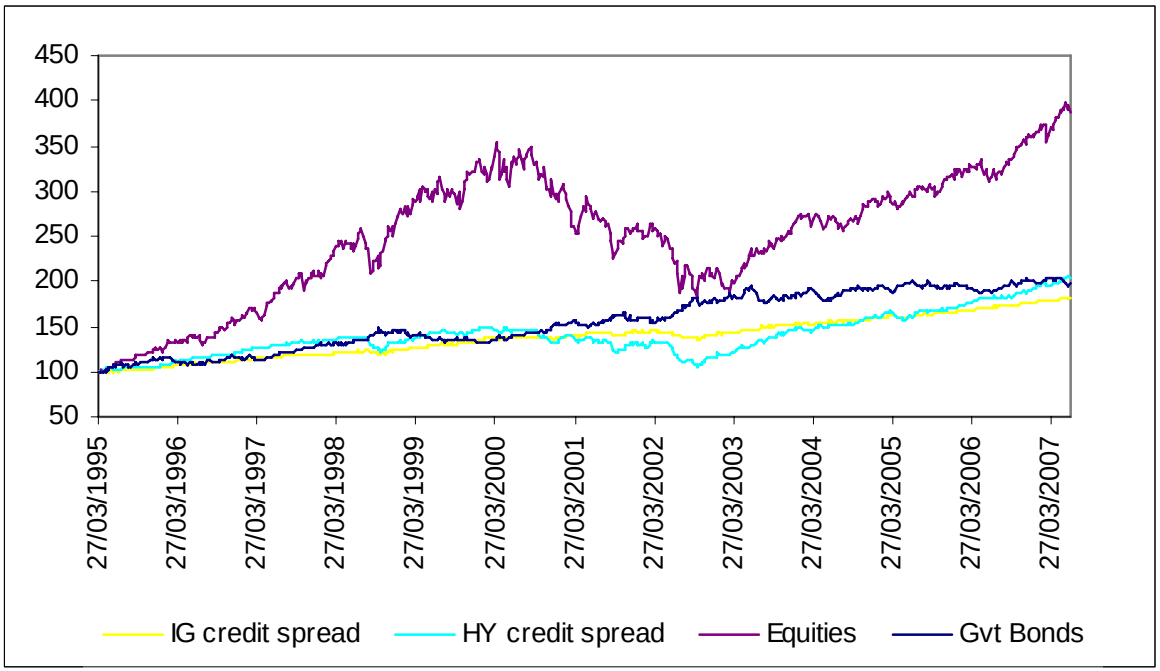
- Weekly returns of gvt bonds, IG and HY bonds, equities in USD
- April 1995-June 2007
- Data source : Datastream for equity and govies (10Y benchmark) indices, Merrill Lynch for corporate bonds indices



Data

Credit derivatives returns

- IG and HY CDS indices approximation
- Swap rates from Datastream



Historical risk / return tradeoff

Historical volatility

- Low level of volatility of corporate bond indices (especially HY) compared to govies
- Smaller vol for credit derivatives than corporate bonds for IG
- Higher vol for credit derivatives than corporate bonds for HY

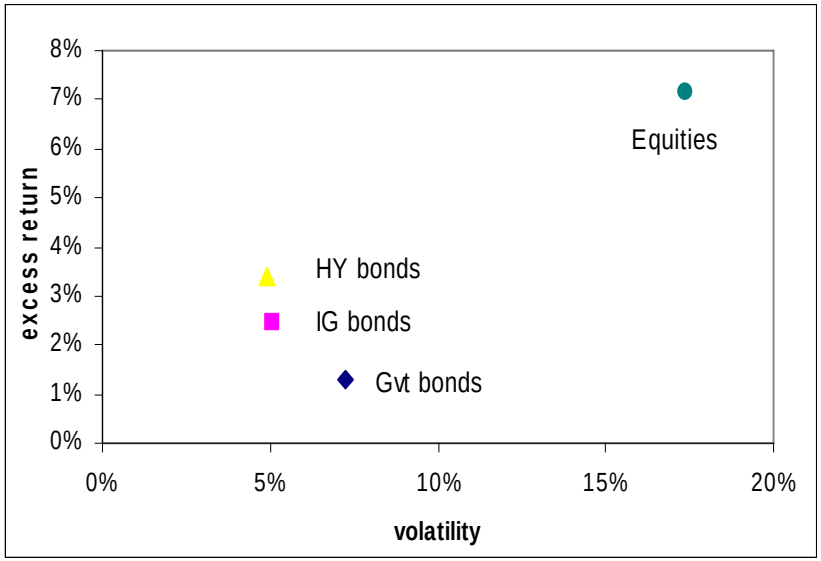
Historical returns

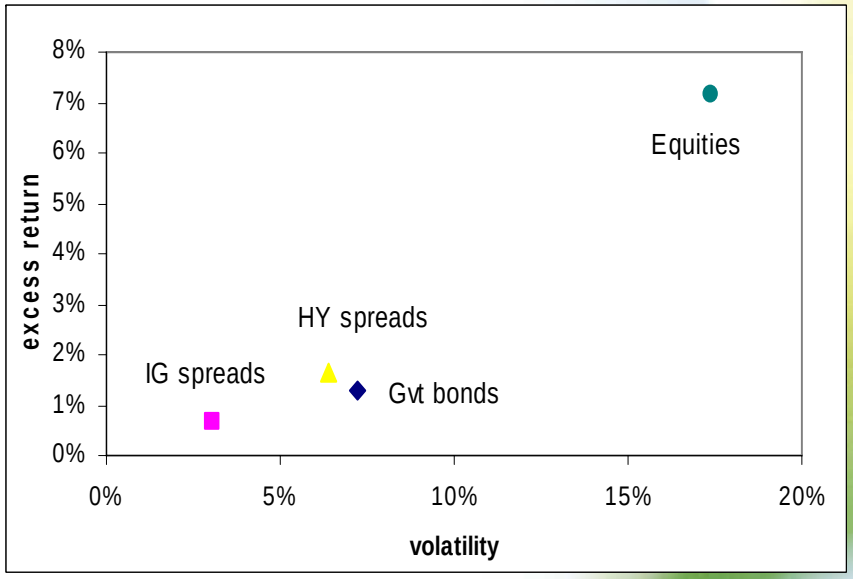
- 120 bp credit spread for IG over govies, 70 bp over swap
- 210 bp credit spread for HY over govies, 170 bp over swap

	Gvt Bonds	*IG bonds*	*IG spreads*	*HY bonds*	*HY spreads*	*Equities*
Excess return	1.3%	2.5%	0.7%	3.4%	1.7%	7.2%
Volatility	7.2%	5.1%	3.1%	4.9%	6.4%	17.4%
Sharpe ratio	0.18	0.49	0.22	0.69	0.26	0.41

Historical risk / return tradeoff

- Discrepancy in the Sharpe ratios for all asset classes
  - Attractive Sharpe ratios for IG (0.49) and HY bonds (0.69)
  - Less attractive picture for credit derivatives (0.22 and 0.26), but still more interesting than govies





Correlations

- Much weaker (even negative) correlation of credit spreads with Treasuries
- Similar correlation with equities
- Credit derivatives have a strong diversifying power in a global portfolio

	Gvt bonds	IG bonds	HY bonds	Equities
Gvt bonds		94%	16%	-7%
IG bonds			38%	2%
HY bonds				30%
Equities				

	Gvt bonds	IG spreads	HY spreads	Equities
Gvt bonds		-34%	-63%	-7%
IG spreads			64%	8%
HY spreads				26%
Equities				100.0%

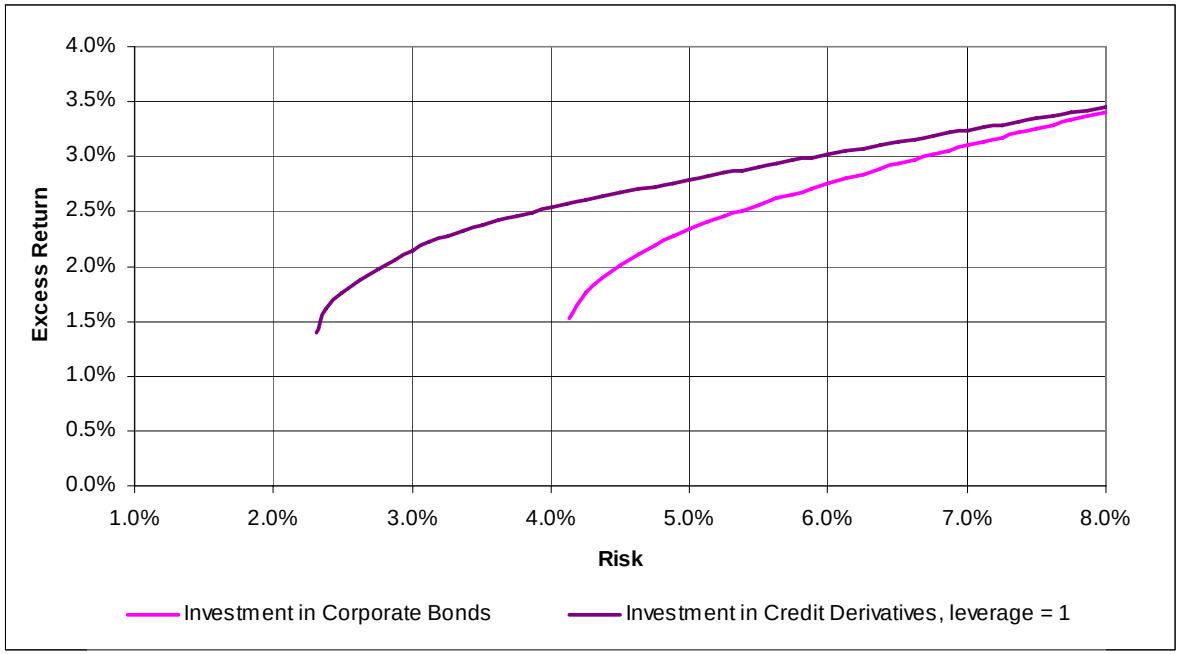
Portfolio construction

Classic mean variance optimization with no short selling constraint

- Historical VCV matrices on the studied period
- Historical expected returns lead to inconsistent efficient frontiers
  - **We suppose a constant Sharpe ratio at 0.3 for each asset class**
  - **Intermediate level between historical levels for Treasuries 0.18 and equities 0.41, close to credit spreads 0.22-0.26**
- This makes portfolio composition depend only on the risk profile
- Optimal weights independant of the level of the Sharpe ratio

Results

Efficient frontiers : traditional credit compared to credit derivatives (no leverage)



Results

Improvement in the efficient frontier by investing in credit derivatives

- Including IG credit derivatives, we can achieve much less volatile portfolios than with traditional corporate bonds
- At higher risk level, IG spreads disappear in favor of HY spreads
- Credit derivatives offer strong decorrelation and allow to introduce more risky assets (equities) for same level of portfolio risk

	Portfolio Risk		
	3.0%	5.0%	7.0%
Excess Return	-	2.3%	3.1%
	Optimal Weights		
Gvt bonds	-	43%	59%
IG bonds	-	0%	0%
HY bonds	-	42%	8%
Equities	-	15%	32%

	Portfolio Risk		
	3.0%	5.0%	7.0%
Excess Return	2.1%	2.8%	3.2%
	Optimal Weights		
Gvt bonds	45%	45%	44%
IG spreads	4%	0%	0%
HY spreads	47%	32%	20%
Equities	5%	23%	37%

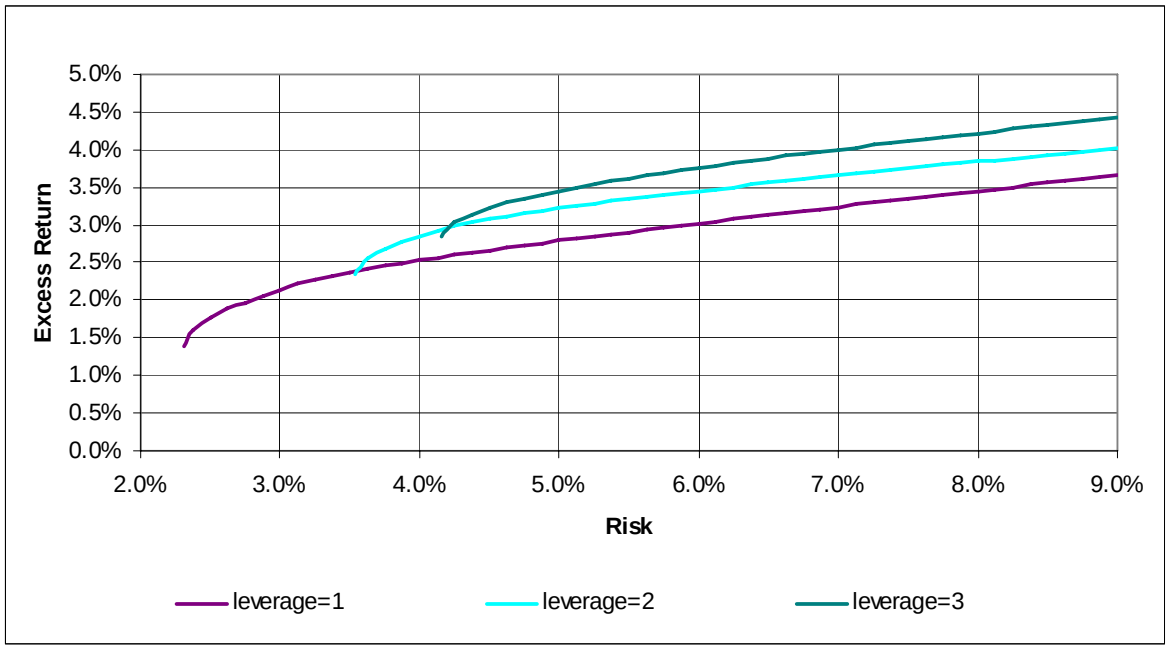
Traditional credit compared to leveraged credit derivatives

Influence of leverage

No change in the Sharpe ratio

$$r(L) = r_f + L*(r - r_f)$$
$$\sigma(L) = L*\sigma$$

$$SR(L) = \frac{r(L) - r_f}{\sigma(L)} = \frac{L*(r - r_f)}{L*\sigma} = \frac{(r - r_f)}{\sigma}$$



Traditional credit compared to leveraged credit derivatives

Influence of leverage

- **Leveraging increases portfolio risk and allows higher returns**
- **At identical risk level, the higher the leverage, the more we can reduce the share of risky assets in the portfolio in favour of Treasuries**
- **Optimal allocations contain majority of Treasuries, HY and then equities**

	Portfolio Risk (L=2)		
	3.0%	5.0%	7.0%
Excess Return	-	3.2%	3.7%
	Optimal Weights		
Gvt bonds	-	50%	35%
IG bonds	-	0%	0%
HY bonds	-	35%	36%
Equities	-	16%	29%

	Portfolio Risk (L=3)		
	3.0%	5.0%	7.0%
Excess Return	-	3.5%	4.0%
	Optimal Weights		
Gvt bonds	-	62%	46%
IG spreads	-	0%	0%
HY spreads	-	28%	34%
Equities	-	10%	20%

Conclusion

- **We examine how credit derivatives change the construction of an efficient portfolio**

- **We compare 2 types of credit instruments included in a US global portfolio (including gvt bonds and equities)**
  - **conventional corporate bonds**
  - **credit derivatives**

- **Credit risk component has :**
  - **very low risk for IG, medium risk (smaller than govies) for HY**
  - **strong diversifying power relative to traditional asset classes (negative correlation with govies)**

- **Efficient frontiers in a mean variance framework show**
  - **the advantage of credit derivatives for portfolio diversification**
  - **usefulness of leveraging to allow flexible risk modulation**

Conclusion

Directions for future research

Expected returns hypothesis

- Strong hypothesis of constant Sharpe ratio

Asymetric nature of credit spreads distribution

- short spikes and long periods of low values
- Mean variance framework problematic for credit spreads : use VaR, conditional VaR ?

Analysis of crisis episodes

- Credit derivatives performances / risk in times of stress
- Consequence for asset allocation