



Managing Downgrade Risk in Long-Horizon Credit Portfolios

Jay Hyman

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Albert Desclée

+44 20 7773 3382

albert.desclee@barclays.com

Jay Hyman

+972 3 623 8745

jay.hyman@barclays.com

Anando Maitra

+44 20 3134 0091

anando.maitra@barclays.com

Simon Polbennikov

+44 20 3134 0752

simon.polbennikov@barclays.com

Outline

"Try-and-Hold" framework for long-horizon risk/return analysis of credit portfolios

- Goal – long-horizon evaluation of credit portfolio guidelines:
- Benchmark selection/long-term asset allocation
- Investment policy (specifically, sell discipline)
- Framework: simulation based on empirical studies
- Sample results:
 - Long-term risk/return by asset class and sell discipline
 - Optimal asset allocation under different sell disciplines, regulatory environments

Country/Sector Diversification in Credit Portfolios: Downgrade risk vs Market risk

- Motivating question: should domestic credit investors diversify globally?
- We evaluate the importance of diversification by country and by sector two ways:
 - Pure monthly mark-to-market framework
 - With a focus on downgrade risk

Role of different portfolio dimensions

- Try-and-Hold model: optimal credit market allocations by Quality and Maturity
- Downgrade Risk study: effect of diversification by Sector and Country
- This corresponds to our view that these attributes play different roles in determining portfolio performance

	Risk Factors	Exposures to Risk Factors
Definition	Major sources of potential systematic shock	Control the impact of a shock to a particular risk factor
Examples	Sector – financials widen Country – UK spreads widen	Maturity Rating DTS
Uses	<ul style="list-style-type: none">• Avoid large concentrations• Express active views	<ul style="list-style-type: none">• Investment policy sets limits• Allocations determine long-term risk/return characteristics• Relevance of ratings is based on guidelines/regulation

Source: Barclays Research

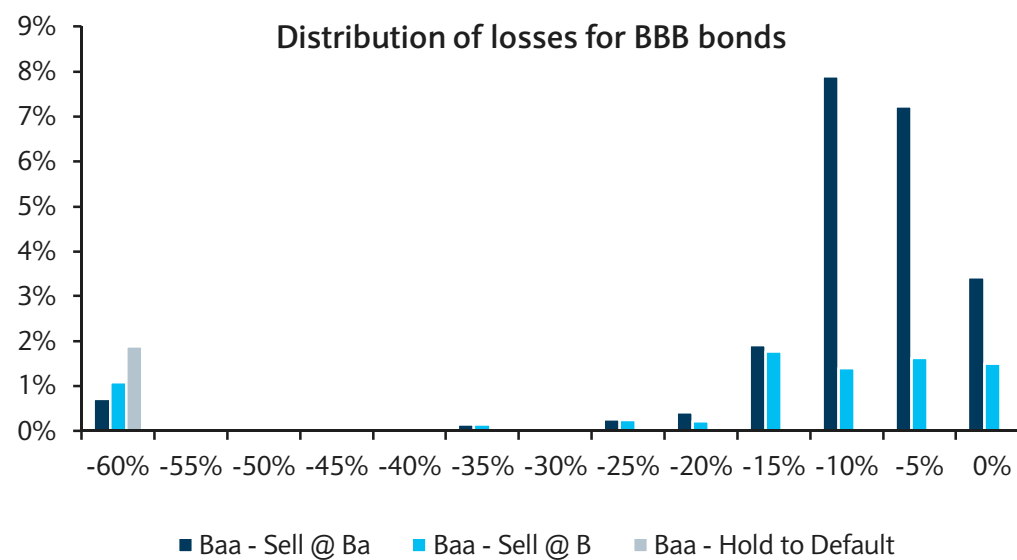
Try-and-Hold framework for individual bonds

Basic idea – long-term loss distribution is based on sell threshold

- Pure Buy and Hold – hold to either maturity or default – binary outcome
- Sell disciplines with forced sales after downgrades:
 - Reduce probability of default losses
 - Increase probability of losses due to forced sale
 - If forced to sell upon downgrade to HY – will suffer from “Fallen Angel” effect

Five-year loss distribution for individual BBB bonds: Long-term Moody's matrix (1970-2012)

Rating	Transition prob.	Long term spread	Current spread
AAA	0.0%	68	68
AA	0.2%	79	79
A	4.4%	110	110
BBB	90.0%	162	162
BB	4.3%	309	309
B	0.8%	463	463
CAA	0.2%	839	839
CA_C	0.0%	1,863	1,863
Default	0.2%		



Source for both charts: Barclays Research

“Try and Hold” for Diversified Portfolios - Summary

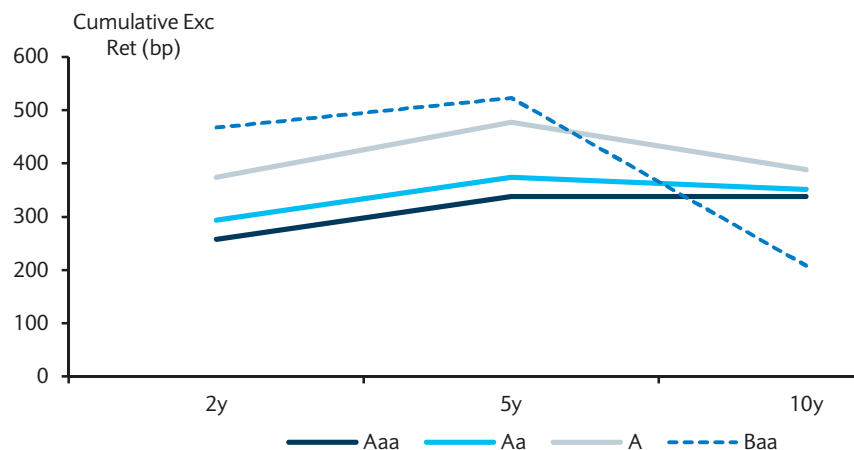
Our enhanced “Try-and-Hold” model helps understand long-term credit investing

- Key features of the model - largely based on empirical observations:
 - Risk is driven not by MTM volatility but by realized losses due to downgrades and defaults
 - Sell discipline plays a key role in determining asset risk and return
 - “Fallen Angel” bonds are subject to strong selling pressure at time of downgrade
 - Expected downgrade rates are linked to spread levels
 - Widening of spreads reduce returns in two ways:
 - Systematic increase in downgrade probabilities
 - Increased losses upon a forced sale (wider spreads among quality ratings)
 - Mean reversion of spreads can mitigate the effects of spread widening
 - Elevated spreads can also present a buying opportunity
 - Simulation of long-horizon returns incorporating all of the above

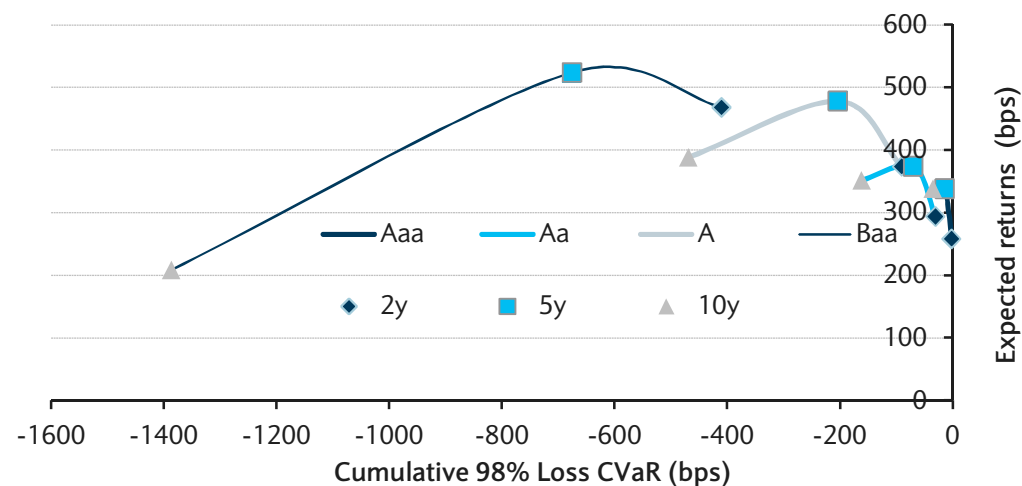
Simulation results (Sell@BB, 5-year Horizon): Maturity Effect

- Expected returns increase as we extend to lower ratings within 2y or 5y assets
- Expected returns at five-year horizon are highest for 5y bonds. Extending to 10y maturities increases expected losses from forced sales, leading to decreased expected returns
- The plot on the right shows these expected returns versus tail risk (worst-case loss at 98% confidence)
- The highest expected return shown is for 5y BBB assets – but the CVaR plot shows that these have substantially higher tail risk than 5y A assets for marginally greater expected return

Expected Returns by Quality & Maturity



Exp. Returns vs Tail Risk (98% Loss CVaR)

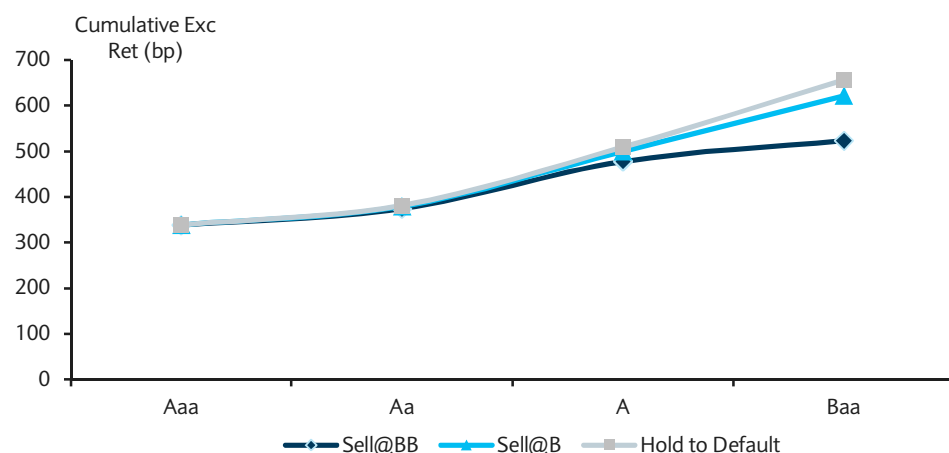


Source for both charts: Barclays Research

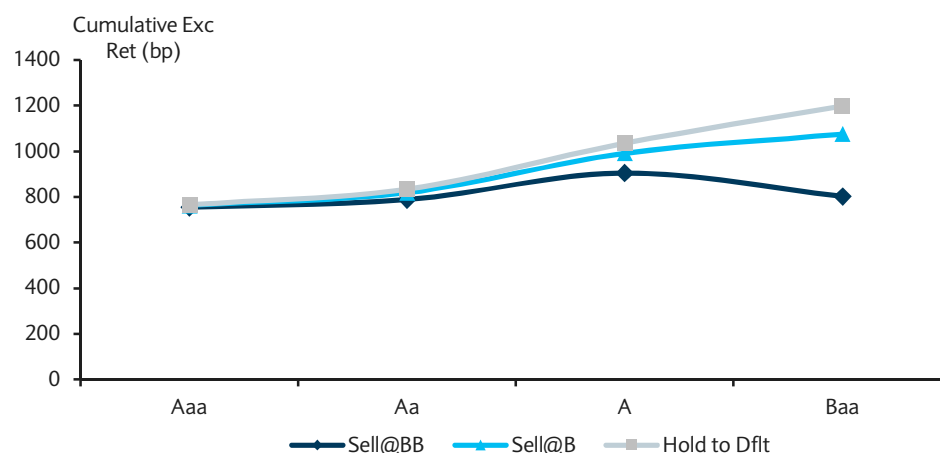
Simulation results – effect of sell discipline

- For investment-grade assets, expected losses from forced sales are much greater than those from defaults
- The most aggressive sell discipline (sell@BB) consistently shows the lowest expected returns
- This effect is strongest for BBB assets; their proximity to the sell threshold makes forced sales very likely
- On a 5y horizon, expected returns of BBB assets are still higher than A (although possibly not by enough to justify the additional risk)
- For 10y assets under a Sell@BB discipline, A bonds outperform BBB

Exp. Returns of 5y Assets @ 5y Horizon



Exp. Returns of 10y Assets @ 10y Horizon

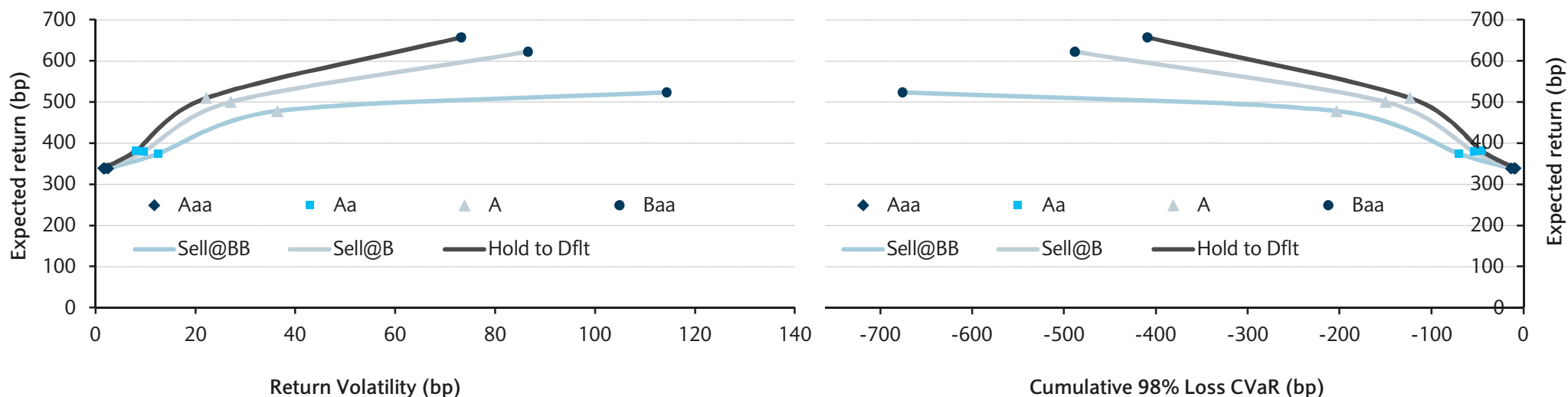


Source for both charts: Barclays Research

Effect of Sell Discipline: 5y Bonds @ five-year Horizon

- We plot the portfolio risk-return trade-off by rating under different sell thresholds
- Use of a less aggressive sell discipline (holding distressed debt for longer):
 - Increases expected returns
 - Decreases volatility of horizon returns
 - Decreases tail risk of horizon losses (98% loss CVaR)

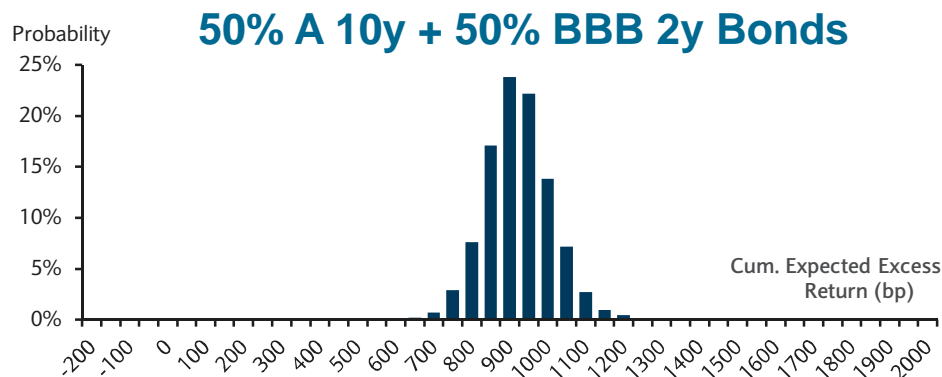
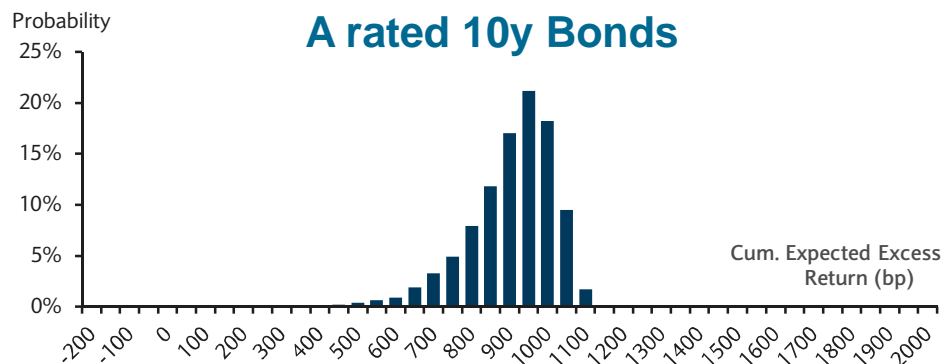
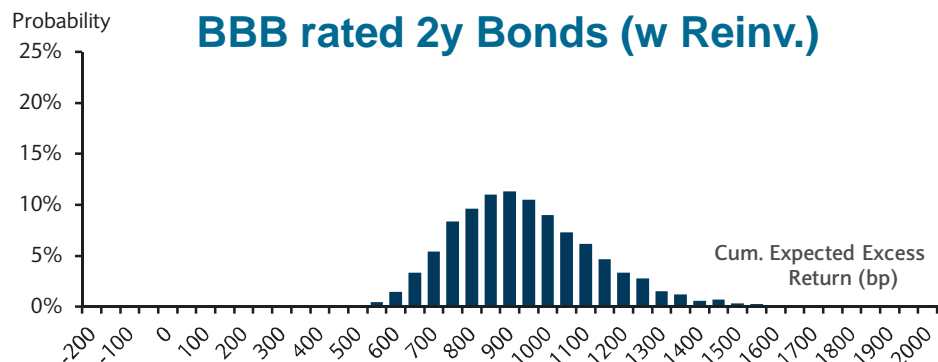
Cumulative return versus volatility and loss CVaR Under Different Sell Disciplines



Source for both charts: Barclays Research

Results: Return Distributions to 10y Horizon (Sell@BB)

- For short-dated (2y) assets over a 10y horizon, losses due to forced sales and defaults are relatively small
- Volatility in 2y is mainly reinvestment risk, giving a symmetric two-sided distribution
- For 10y assets, volatility is mainly from risk of loss, with a strong downside tail
- Spread-widening scenarios will result in higher losses for 10y bonds but offer potentially higher reinvestment returns for 2y bonds
- A blend of BBB 2y with A 10y offers a nice diversification of these risks
- Worst-case returns improve from 580bp and 494bp for the two assets individually to 709bp for the 50/50 blend



Source for all charts on this slide: Barclays Research

Results: Correlation of 10y Horizon Returns (Sell@BB)

- We look at the correlations among the simulated cumulative returns over a 10-year horizon
- Cumulative 10-year returns of all assets depend on a combination of reinvestment and losses. For shorter, higher-quality assets, reinvestment risk dominates; for longer, lower-quality – loss risk.
- Dependence on spreads causes negative return correlation between reinvestment and losses
- These results suggest the benefits of combining assets of different maturities in portfolio construction, possibly shorter-maturity Baa assets with longer-maturity A assets, as above

Correlations between cumulative returns in different rating–maturity buckets

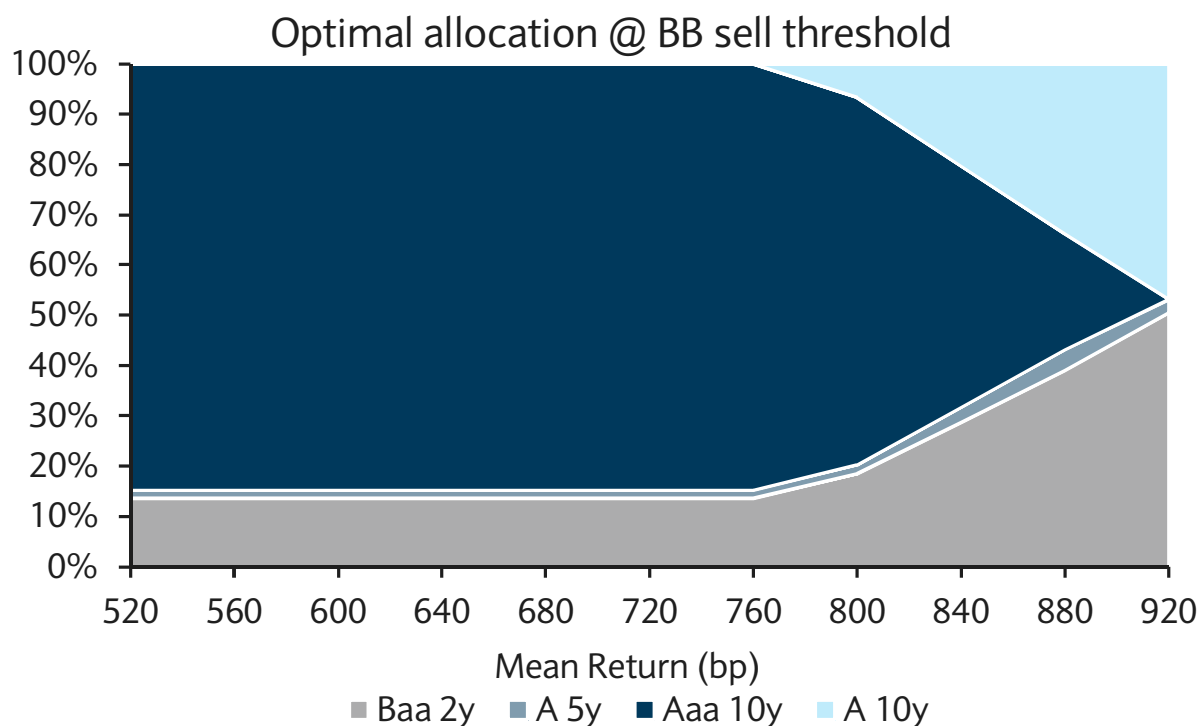
Maturity	Rating	2y				5y				10y			
		Aaa	Aa	A	Baa	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa
2y	Aaa	1.00	1.00	0.99	0.91	0.59	0.52	0.38	0.04	-0.70	-0.72	-0.74	-0.74
	Aa	1.00	1.00	1.00	0.93	0.58	0.52	0.39	0.05	-0.66	-0.69	-0.71	-0.71
	A	0.99	1.00	1.00	0.95	0.57	0.52	0.40	0.07	-0.61	-0.64	-0.67	-0.67
	Baa	0.91	0.93	0.95	1.00	0.49	0.46	0.38	0.15	-0.37	-0.40	-0.44	-0.46
5y	Aaa	0.59	0.58	0.57	0.49	1.00	0.99	0.95	0.73	-0.48	-0.51	-0.52	-0.51
	Aa	0.52	0.52	0.52	0.46	0.99	1.00	0.98	0.80	-0.38	-0.41	-0.43	-0.41
	A	0.38	0.39	0.40	0.38	0.95	0.98	1.00	0.91	-0.19	-0.22	-0.24	-0.23
	Baa	0.04	0.05	0.07	0.15	0.73	0.80	0.91	1.00	0.20	0.18	0.16	0.16
10y	Aaa	-0.70	-0.66	-0.61	-0.37	-0.48	-0.38	-0.19	0.20	1.00	0.99	0.96	0.91
	Aa	-0.72	-0.69	-0.64	-0.40	-0.51	-0.41	-0.22	0.18	0.99	1.00	0.99	0.95
	A	-0.74	-0.71	-0.67	-0.44	-0.52	-0.43	-0.24	0.16	0.96	0.99	1.00	0.99
	Baa	-0.74	-0.71	-0.67	-0.46	-0.51	-0.41	-0.23	0.16	0.91	0.95	0.99	1.00

Source: Barclays Research

Allocation: Efficient frontier with CVAR optimization

- We show an example efficient frontier with a BB sell threshold
- We construct portfolios that minimize 98% CVAR for a given minimum return target
- We consider 4 IG ratings (AAA, AA, A, BBB) and three maturity (2y, 5y, 10y) buckets
- At low-return targets, the portfolio largely barbells between BBB 2y and AAA 10y
- At higher minimum-return targets, allocation to A 10y replaces the AAA allocation

Optimal allocation – BB sell threshold



Source: Barclays Research

“Try-and-Hold” Analysis of Insurance Company Portfolios

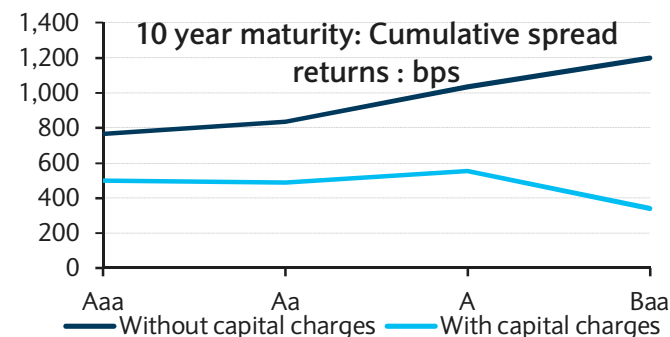
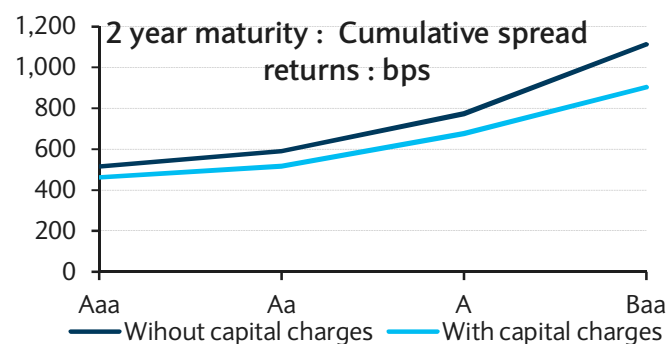
No forced sales, but downgrades increase regulatory capital requirements

- For many long-horizon investors, downgrades do not trigger forced sales
- However, regulatory capital requirements are driven by spreads and ratings
- For a given asset allocation, our “Try-and-Hold” framework allows us to calculate how regulatory capital charges are likely to change over time under different spread levels and downgrade rates
- In the following example, we show how portfolio allocation decisions may be affected under two different variations of the Solvency II regulatory framework:
 - Standard treatment
 - In liability-matched portfolios eligible for “Matching Adjustment” (MA) treatment

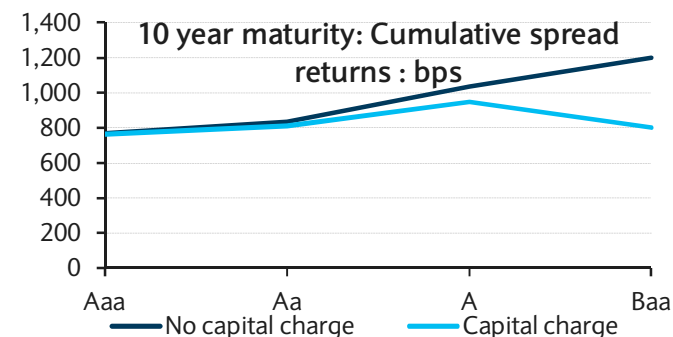
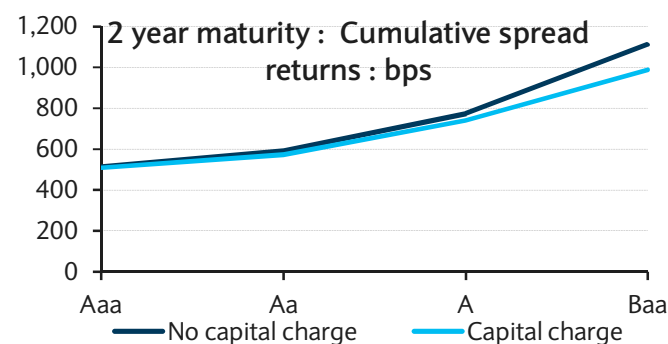
Expected returns with capital charges – 10-year horizon

- We calculate the amount of regulatory capital that must be set aside initially, as well as how it may change through our simulation. Capital charges increase on downgrades or defaults.
- Assuming a 6% cost of capital, we deduct a capital charge from portfolio return
- Lower-rating and higher-duration buckets such as the BBB 10y have very high capital charges which substantially reduce their spread advantage
- Matching adjustment framework allows a smaller capital charge, but still works as disincentive for longer-maturity BBB debt

Solvency II: Standard



Solvency II: With Matching Adjustment



Source for all charts: Barclays Research; "Technical Specification for the Preparatory Phase (Part 1)", April 2014 by EIOPA (European Insurance regulatory authority)

Correlations of 10y Horizon Returns (with capital charges)

- We report correlations among simulated cumulative returns over a 10-year horizon for a European insurance portfolio subject to Solvency II (with no matching adjustment)
- Effect of downgrades is an increase in capital charges rather than forced sales
- Cumulative returns depend on both reinvestment dynamics and capital charges
 - For shorter, higher-quality assets, reinvestment risk dominates
 - For longer, lower-quality assets, capital charge risk is more important
- Spread dependence => negative correlation between reinvestment and capital charges

Correlations among cumulative returns in different rating–maturity buckets

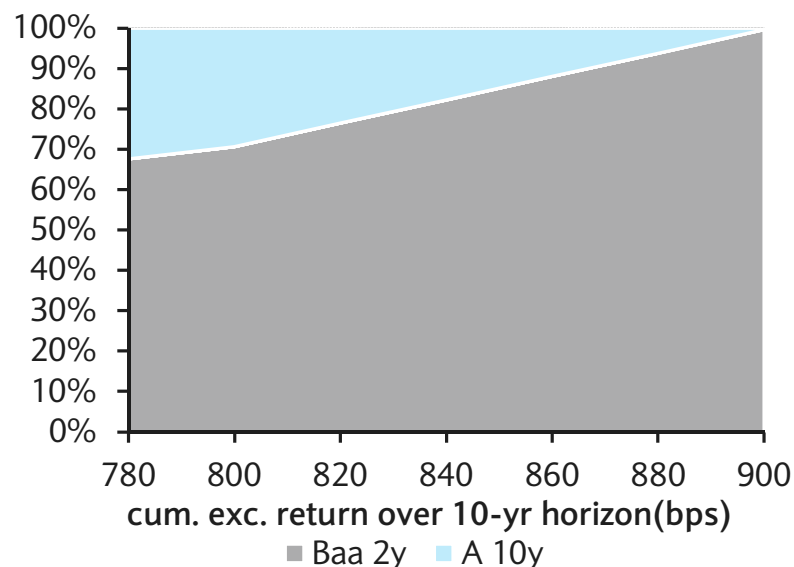
Maturity	Rating	2y				5y				10y			
		Aaa	Aa	A	Baa	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa
2y	Aaa	100%	100%	100%	98%	59%	56%	51%	36%	-58%	-59%	-61%	-62%
	Aa	100%	100%	100%	99%	59%	56%	51%	37%	-55%	-56%	-58%	-59%
	A	100%	100%	100%	99%	59%	56%	52%	38%	-53%	-53%	-55%	-56%
	Baa	98%	99%	99%	100%	57%	55%	52%	41%	-41%	-42%	-44%	-45%
5y	Aaa	59%	59%	59%	57%	100%	100%	98%	91%	-38%	-39%	-40%	-41%
	Aa	56%	56%	56%	55%	100%	100%	99%	94%	-32%	-32%	-34%	-35%
	A	51%	51%	52%	52%	98%	99%	100%	97%	-22%	-22%	-24%	-25%
	Baa	36%	37%	38%	41%	91%	94%	97%	100%	1%	1%	0%	-1%
10y	Aaa	-58%	-55%	-53%	-41%	-38%	-32%	-22%	1%	100%	99%	99%	97%
	Aa	-59%	-56%	-53%	-42%	-39%	-32%	-22%	1%	99%	100%	100%	99%
	A	-61%	-58%	-55%	-44%	-40%	-34%	-24%	0%	99%	100%	100%	100%
	Baa	-62%	-59%	-56%	-45%	-41%	-35%	-25%	-1%	97%	99%	100%	100%

Source: Barclays Research

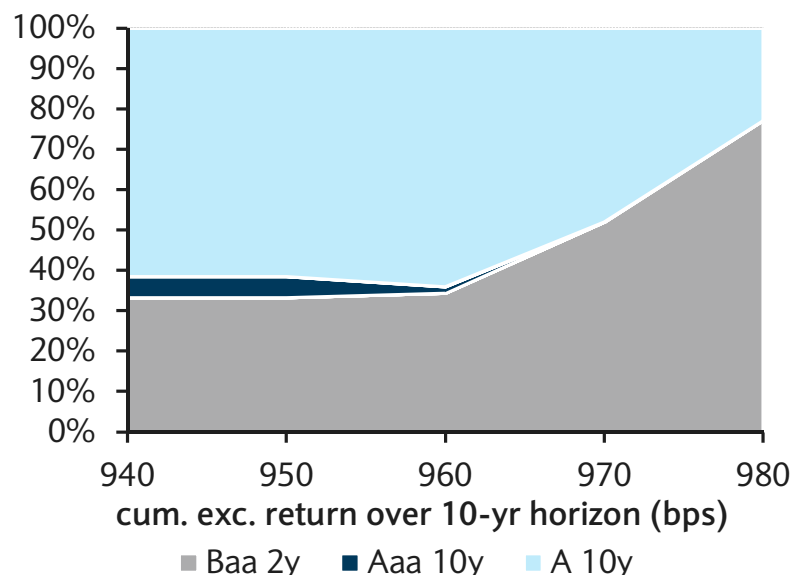
Tail Risk Optimization (with capital charges), 10-year horizon

- We show an example efficient frontier based on Solvency II capital charges
- We consider four IG ratings (AAA, AA, A, BBB) and three maturity cells (2y, 5y, 10y)
- We construct portfolios that minimize 98% CVaR for a given minimum return target
- We adjust for capital charges using 6% cost of capital, with and without MA
- The optimal portfolio is a barbell between BBB 2y and A 10y, illustrating the benefit of diversification between capital charge risk and reinvestment
- Matching adjustment treatment favors higher-rated assets more strongly

Solvency II: Standard



Solvency II: With Matching Adjustment



Source for both charts: Barclays Research; "Technical Specification for the Preparatory Phase (Part 1)", April 2014 by EIOPA (European Insurance regulatory authority)

Country/Sector Diversification in Credit Portfolios: Downgrade risk versus Market risk

How do corporate bond markets compare across currencies?

- Large multinationals: 96 issuers of 1206 issue in all 3 markets, comprise 45% of MV
- Single-currency issuers tend to be much smaller
- Differences across markets: typical durations, spreads, liquidity all vary
- Diversification within home market: more diversification available for US investors
- Should UK and Euro investors make the effort to diversify globally?
- (Assume fully hedged rates & FX; focus on credit – excess returns or downgrades)

Profile of global corporate bond market by currency of issuance

	Universe	GBP	EUR	USD	GBP-only	EUR-only	USD-only	GBP-EUR	GBP-USD	USD-EUR	GBP-USD-EUR
# Bonds	5,643	555	1,260	3,828	171	410	2,424	163	144	520	1,811
# Issuers	1,206	222	344	940	80	156	766	30	16	62	96
MV (GBP bn)	3,410	272	949	2,190	62	229	1,051	90	91	347	1,540
Avg L-OASD (yr)	5.95	8.61	4.69	6.17	9.87	4.40	6.32	6.25	7.88	5.35	5.78
Avg L-OAS (bp)	93	119	44	111	133	57	129	77	114	72	76
Avg Liquidity Cost Score	0.70	0.92	0.37	0.83	1.38	0.47	1.03	0.63	0.95	0.56	0.53
Avg MV per issuer (GBP bn)	2.8	1.2	2.8	2.3	0.8	1.5	1.4	3.0	5.7	5.6	16.0
% of global MV		8%	28%	64%	2%	7%	31%	3%	3%	10%	45%

Note: Senior, non-callable investment-grade corporate bonds in USD, EUR, or GBP from the Barclays Global Aggregate Index, as of 28 November 2014.
Source: Barclays Research

Industry profile of G3 corporates by currency of issuance

Potential for industry diversification varies significantly by currency

# Issuers by sector (Class3)	Universe	GBP	EUR	USD	GBP-only	EUR-only	USD-only	GBP-EUR	GBP-USD	USD-EUR	GBP-USD-EUR
BANKING	173	32	74	138	2	32	96	1	1	13	28
BASIC_INDUSTRY	79	7	20	68	0	9	59	2	0	4	5
BROKERAGE_ASSETMGERS_EXCHANGES	35	4	6	31	1	1	28	2	0	2	1
CAPITAL_GOODS	71	6	25	57	0	11	45	3	1	9	2
COMMUNICATIONS	65	23	31	51	2	8	29	4	3	5	14
CONSUMER_CYCLICAL	86	18	30	62	5	16	50	3	1	2	9
CONSUMER_NON_CYCLICAL	147	23	45	129	3	13	96	2	3	15	15
ELECTRIC	68	11	15	56	2	7	49	3	2	1	4
ENERGY	90	7	11	85	0	5	77	0	2	1	5
FINANCE_COMPANIES	13	3	5	9	1	3	7	0	0	0	2
FINANCIAL_OTHER	46	28	2	17	28	1	16	0	0	1	0
INDUSTRIAL_OTHER	40	5	6	33	2	3	32	2	0	0	1
INSURANCE	85	8	13	73	4	7	68	1	0	2	3
NATURAL_GAS	30	8	12	14	6	10	12	0	0	0	2
REITS	54	8	16	34	6	13	31	1	1	2	0
TECHNOLOGY	56	1	7	53	0	3	49	0	0	3	1
TRANSPORTATION	52	17	19	26	11	13	20	2	2	2	2
UTILITY_OTHER	16	13	7	4	7	1	2	4	0	0	2
Sum	1206	222	344	940	80	156	766	30	16	62	96

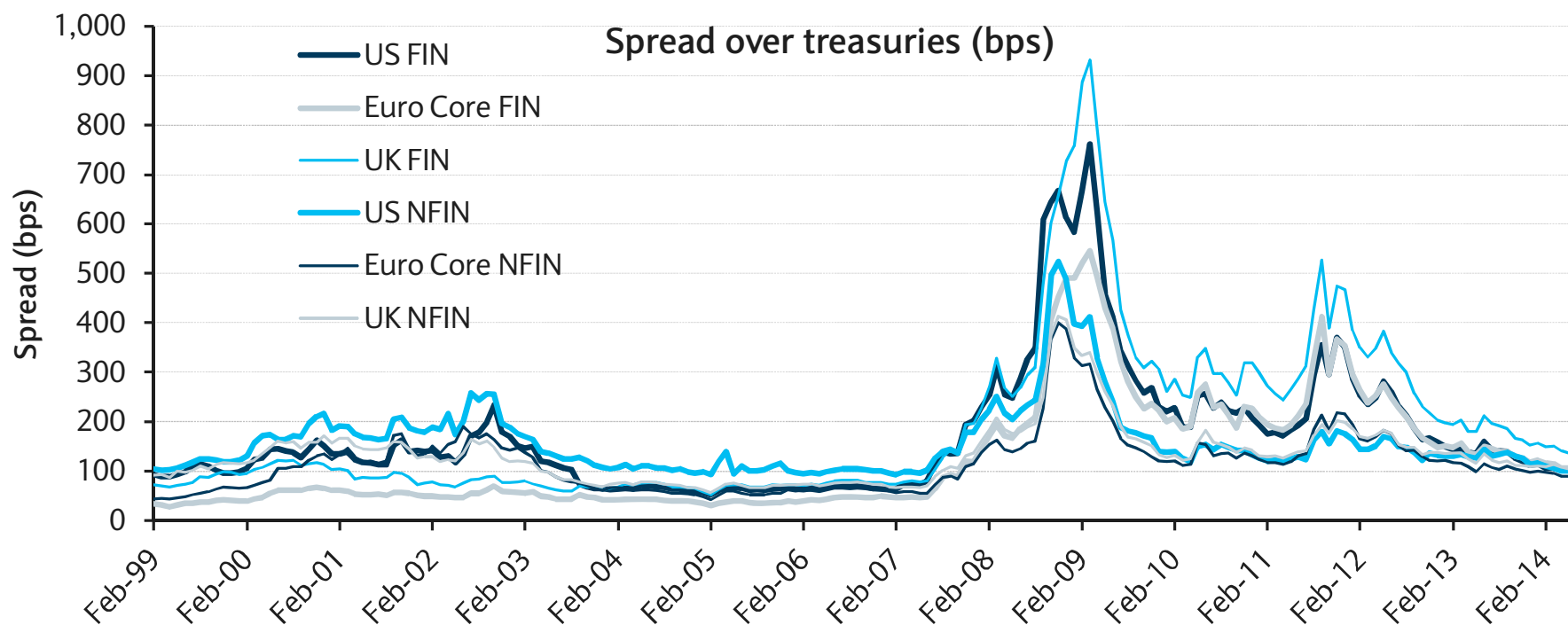
Note: Senior, non-callable investment-grade corporate bonds in USD, EUR, or GBP from the Barclays Global Aggregate Index, as of 28 November 2014.

Source: Barclays Research

Historical spreads

- We partition global corporates by country of domicile and broad sector: financials and non financials to obtain spread series for six country-sector buckets
- Peripheral issuers are excluded
- Spreads have been highly correlated across countries and sectors

Spreads of major country-sector buckets of Barclays corporate bond indices



Source : Barclays Research

Excess return correlations

Excess returns have been highly correlated

- Excess returns* are calculated over duration matched treasuries
- High positive correlations across countries and sectors
- Sector seems to be the dominant dimension: correlations of 90% or higher

Correlations of 12-month cum. excess returns (Feb 1999 to Jun 2014)

	US FINANCIALS	EU FINANCIALS	UK FINANCIALS	US NON - FINANCIALS	EU NON - FINANCIALS	UK NON - FINANCIALS
US FINANCIALS	100%	95%	90%	89%	90%	94%
EU FINANCIALS	95%	100%	97%	76%	81%	86%
UK FINANCIALS	90%	97%	100%	67%	70%	78%
US NON - FINANCIALS	89%	76%	67%	100%	98%	95%
EU NON - FINANCIALS	90%	81%	70%	98%	100%	97%
UK NON - FINANCIALS	94%	86%	78%	95%	97%	100%

Note: *Excess returns over duration-matched Treasuries are calculated monthly within each market, then compounded to obtain cumulative excess returns over a rolling 12-month window.
Source: Barclays Research,

Excess return statistics

Financials have been significantly more volatile than non-financials

- Excess return volatility of Financials is higher than Non-Financials in all three markets
- Difference in tail statistics is even larger

Excess return risk summary statistics (Feb 1999 to Jun 2014)

Excess returns on annual horizons						
	US FINANCIALS	EU FINANCIALS (core)	UK FINANCIALS	US NON - FINANCIALS	EU NON - FINANCIALS (core)	UK NON - FINANCIALS
Average: %/y	1.1	0.7	0.5	0.6	0.9	1.1
Volatility: %/y	7.9	5.2	10.1	5.8	3.5	4.3
CVAR (75%): %/y	-7.6	-5.3	-10.8	-5.6	-2.9	-3.6
CVAR (90%): %/y	-14.3	-9.5	-20.2	-8.7	-4.6	-6.6

Source: Barclays Research

Effect of sector and country diversification on excess returns

Limited scope for diversification of market risk

- We compare a concentrated portfolio of US Financials to a 50/50 blend with each other asset
- Diversification effect: proportional change in portfolio volatility due to imperfect correlations – adjusts for the differences in volatility across asset classes
- Measure can also be used for tail risk – indicates the benefit from imperfect correlations
- Benefits from imperfect correlations are very limited – less than 5%

Analyzing downgrade losses year-by-year (Feb 1999 to Jun 2014)

Excess returns on annual horizons						
	US FIN	US FIN & EU FIN	US FIN & UK FIN	US FIN & US NON-FIN	US FIN & EU NON-FIN	US FIN & UK NON-FIN
Average: %/y	1.1	0.9	0.8	0.8	1.0	1.1
Volatility: %/y	7.9	6.5	8.8	6.7	5.5	6.0
CVAR (75%): %/y	-7.6	-6.4	-9.1	-6.3	-5.0	-5.5
CVAR (90%): %/y	-14.3	-11.7	-17.0	-11.1	-9.3	-10.4
Diversification effect: Volatility		-1.5%	-2.4%	-2.9%	-2.2%	-1.4%
Diversification effect: CVAR (75%)		-0.8%	-0.7%	-4.5%	-4.0%	-1.6%
Diversification effect: CVAR (90%)		-1.7%	-1.5%	-3.0%	-1.3%	-0.7%

Source: Barclays Research

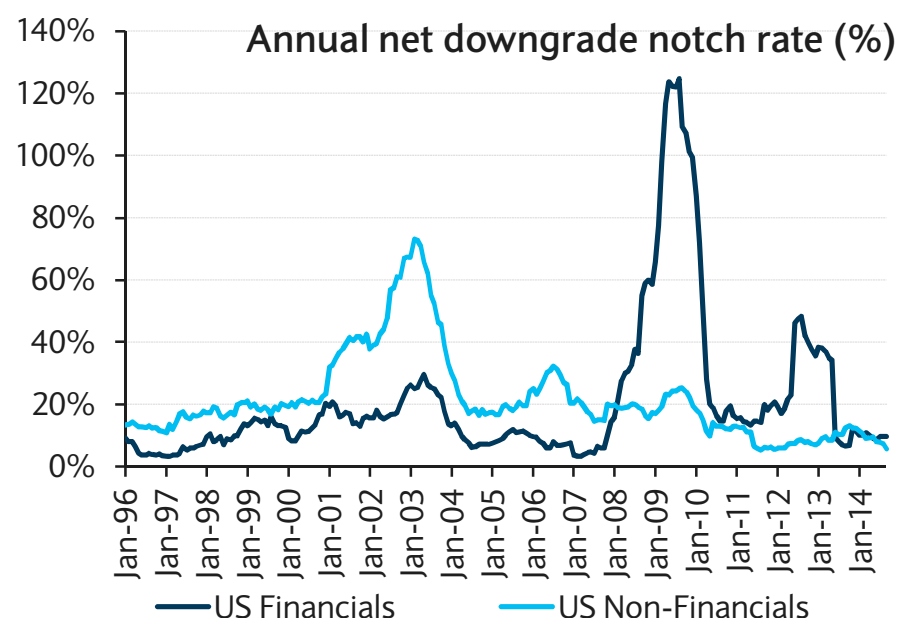
Downgrade risk - downgrade notch rates

- We measure downgrade risk by the variation in downgrade notch rates
 - Downgrade notch rates used to capture probability and magnitude of downgrades
 - Total notches of downgrades over trailing 12m divided by the number of issuers
- As with spread risk, financials are significantly more volatile
- Spikes in downgrade rates occurred at different times for financials and non-financials

Downgrade notch rate statistics

Annual net downgrade notch rates (Feb 1999 - Dec 2013)						
	US FIN	EU FIN	UK FIN	US NON - FIN	EU NON - FIN	UK NON - FIN
Average (%/y)	24%	29%	34%	23%	23%	26%
Volatility (%/y)	26%	31%	33%	16%	14%	17%
CVAR (75%) /y	58%	75%	80%	46%	43%	52%
CVAR (90%) /y	92%	101%	113%	60%	52%	63%

Downgrade notch rate for US issuers



Source for both charts: Moody's, Barclays Research

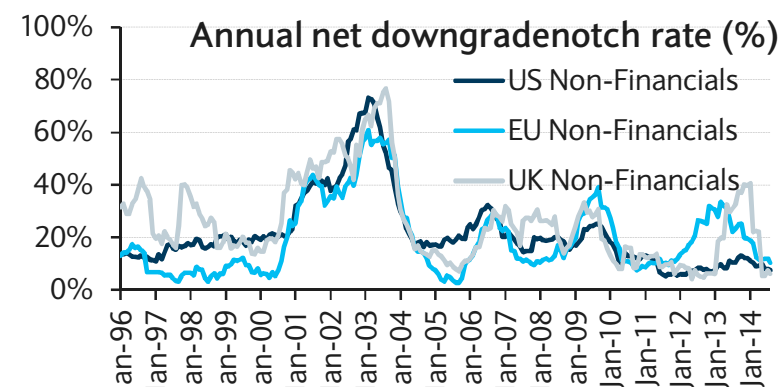
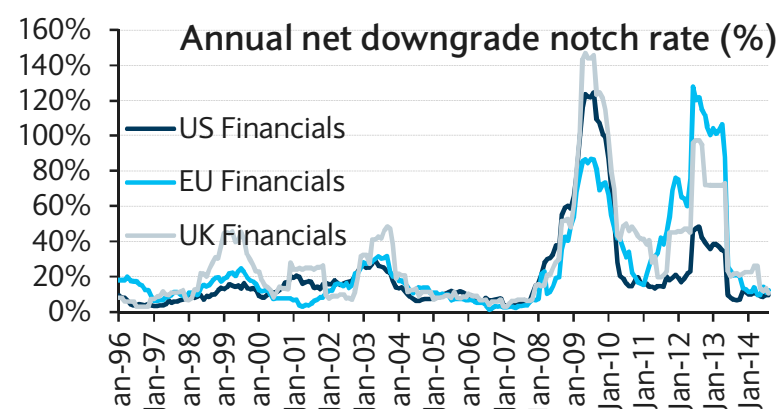
Downgrade correlations by country and sector

- Downgrades have been highly correlated within each sector across countries
- Correlations across sectors have been low or even negative
- Significant diversification potential across sectors

**Downgrade notch rate statistics
(Feb 1999 – Jun 2014)**

	US FIN	EU FIN	UK FIN	US Non-FIN	EU Non-FIN	UK Non-FIN
US FINANCIALS	100%	67%	91%	-4%	26%	-2%
EU FINANCIALS	67%	100%	84%	-32%	17%	-27%
UK FINANCIALS	91%	84%	100%	-17%	25%	-12%
US NON - FINANCIALS	-4%	-32%	-17%	100%	78%	86%
EU NON - FINANCIALS	26%	17%	25%	78%	100%	82%
UK NON - FINANCIALS	-2%	-27%	-12%	86%	82%	100%

Downgrade notch rates for US, UK and Euro core corporate issuers (Feb 1999 – Jun 2014)



Source for all charts on this slide: Moody's, Barclays Research,

Effect of sector and country diversification on downgrade risk

Significant scope for downgrade risk diversification

- We compare a concentrated portfolio of US Financials to a 50/50 blend with each other asset
- Significant diversification benefits when Non-Financials considered
- Drop in portfolio volatility from sector diversification is over 25%, much smaller effect for country diversification

Downgrade risk summary statistics (Feb 1999 to Jun 2014)

Portfolio annual downgrade notch rates						
	US FIN	US FIN & EU FIN	US FIN & UK FIN	US FIN & US NON-FIN	US FIN & EU NON-FIN	US FIN & UK NON-FIN
Average: %/y	24%	27%	29%	24%	24%	25%
Volatility: %/y	26%	26%	29%	15%	17%	16%
CVAR (75%): %/y	58%	66%	68%	45%	46%	47%
CVAR (95%): %/y	92%	89%	101%	59%	61%	61%
Diversification effect: Volatility		-8.5%	-2.1%	-27.6%	-18.5%	-28.5%
Diversification effect: CVAR (75%)		-2.0%	-2.2%	-13.1%	-8.3%	-14.8%
Diversification effect: CVAR (90%)		-8.2%	-1.7%	-22.0%	-15.5%	-21.5%

Source: Moody's, Barclays Research

Downgrade correlations across finer industry sectors

How important is diversification within industrials?

- We combine the three geographical regions and partition non-financials into finer sectors
- Indications of further potential for diversification: different downgrade rates, imperfect correlations

Downgrade correlations for fine industry sectors (Feb 1999 to Jun 2014)

	Financials	Non Financials	Cap Goods	Cons Goods	Energy	Media	Retail	Technology	Transportation	Utilities
Financials	100%	-12%	17%	-22%	-10%	-13%	-20%	-25%	6%	-13%
Non-Fin	-12%	100%	81%	68%	79%	57%	63%	87%	49%	92%
Cap Goods	17%	81%	100%	68%	41%	42%	64%	55%	62%	60%
Cons Goods	-22%	68%	68%	100%	23%	47%	66%	51%	63%	50%
Energy	-10%	79%	41%	23%	100%	32%	15%	73%	15%	85%
Media	-13%	57%	42%	47%	32%	100%	51%	50%	45%	39%
Retail	-20%	63%	64%	66%	15%	51%	100%	51%	40%	44%
Technology	-25%	87%	55%	51%	73%	50%	51%	100%	27%	81%
Transportation	6%	49%	62%	63%	15%	45%	40%	27%	100%	28%
Utilities	-13%	92%	60%	50%	85%	39%	44%	81%	28%	100%

		Annual downgrade notch rates			
Sectors	Number of issuers	Avg	StDev	CVAR 75%	CVAR 90%
Financials	649	27%	28%	68%	95%
Non Financials	1,092	24%	16%	47%	60%
- Cap Industries	225	28%	19%	57%	66%
- Cons Industries	174	20%	10%	34%	37%
- Energy	130	20%	27%	55%	88%
- Media	50	25%	26%	64%	86%
- Retail	48	35%	22%	61%	67%
- Technology	146	32%	22%	61%	84%
- Transportation	43	16%	13%	34%	49%
- Utilities	276	19%	19%	45%	67%
Equal weighted Non Financial sectors		24%	15%	46%	57%

Source for both tables: Moody's, Barclays Research

Diversifying Downgrade Risk – Conclusions

- Mark-to-market risk has been highly correlated across sectors and countries
- However, downgrade risk could be partly diversified across industry sectors
 - Reduction in volatility from imperfect correlations across financials and non-financial downgrades was over 25%...
 - ... while the corresponding reduction in mark-to-market risk was less than 5%
- Significant diversification was possible across finer non-financials sectors
- So, do our results provide strong justification for global credit mandates?
 - Based on annual excess returns – No! Country-sector correlations very strong.
 - Based on risk of downgrades – Maybe:
 - Geographic diversification among major markets is not a major factor per se
 - Good sector diversification is important – globalization can help that
 - Issuer diversification is important – many more issuers available in US

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