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CHICAGO BOARD OPTIONS EXCHANGE

Dispersion

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Disclosures

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What to invest in during this low interest rate environment?

That is a really hard question!

Outline

Defining the Dispersion Trade

Building an example Long Dispersion Portfolio

Comparing Long Dispersion to a bond portfolio

Questions

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What is the Dispersion Trade?

The "Dispersion Trade" is a portfolio of options on the underlying parts of an index versus options on the index itself.

The reason options are a necessary part of "The Dispersion Trade" is that a portfolio of the underlyings themselves should be exactly the same thing, by definition, as the index itself, but when there are options on the "parts" versus options on the "whole" the story is different.

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An Index

Let us construct our own index out of six stocks (none of which pay dividends).

Let us call it the "Dew Jeans 6" or DJ6.

Here are the 6 stock symbols:

Symbol:	Price:	Weight in Index:	
MMM	$100	1.00	
NNN	$50	1.00	Index =
OOO	$30	1.00	sum of
PPP	$20	1.00	prices=
RRR	$50	1.00	$300
SSS	$50	1.00	

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Index = sum of parts

If 1 share of each of the individual names were purchased, the portfolio would cost $300.

If MMM fell to $98, both the portfolio and the Index would equal $298.

Simplistically if someone purchased the parts, and "shorted" the index, there would be no economic exposure…the "short" would hedge the portfolio for any outcome.

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Index = sum of parts

Is that true if you purchased ATM Puts on each stock and sold an ATM Put on the index? No.

Stock	Price(t=0)	Option	Price(t=1)	Put PayOff
MMM	100	100Put	98	2
NNN	50	50Put	49	1
OOO	30	30Put	27	3
PPP	20	20Put	18	2
RRR	50	50Put	49	1
SSS	50	50Put	46	4
DJ6	300	300Put	287	13

What do you mean "NO", they look the same to me?

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Index = sum of parts

The reason is that there was no "dispersion" of the stock prices. They all moved together.

Stock	Price(t=0)	Option	Price(t=1)	Put PayOff
MMM	100	100Put	98	2
NNN	50	50Put	49	1
OOO	30	30Put	27	3
PPP	20	20Put	18	2
RRR	50	50Put	49	1
SSS	50	50Put	46	4
DJ6	300	300Put	287	13

What if they do NOT move together?

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Index = sum of parts

Now with "dispersion" of prices, the portfolio receives $6,

Stock	Price(t=0)	Option	Price(t=1)	Put PayOff
MMM	100	100Put	98	2
NNN	50	50Put	49	1
OOO	30	30Put	27	3
PPP	20	20Put	21	0
RRR	50	50Put	53	0
SSS	50	50Put	51	0
DJ6	300	300Put	299	1

the "short" index Put position pays $1.

Net increase of $5

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▽ Dispersion is the "opposite" of Correlation

When the underlying securities move "together", there is no difference in the final cash payout of this portfolio. That "moving together" is correlation.

To be "Long Dispersion" is to be "Short Correlation"

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What should Dispersion Cost?

Option values are a function of volatility. Indices are (usually) less volatile than the their constituent parts, and so index options should cost less than the options on the "parts"

so $\sigma_{index} <= w_1\sigma_1 + w_2\sigma_2 + w_3\sigma_3 + w_4\sigma_4 + w_5\sigma_5 + w_6\sigma_6$

The only way the volatility of the index could equal the volatility of the "parts" would be if ALL the "parts" had a correlation of 1, and all the parts had the same volatility

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Two assets

$$\sigma_{index} = \sqrt{(w_1\sigma_1)^2 + (w_2\sigma_2)^2 + \rho(1-\rho)w_1w_2\sigma_1\sigma_2}$$

Where ρ = Correlation.

What formula if you have many assets? Cholesky Decomposition…not the point of the presentation.

The point is that negative correlation of the parts of an index will produce a lower volatility of the index itself.

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Option on Index < sum of Options on "parts"

So this portfolio of options should cost more than the option on the index.

Stock	Price(t=0)	Option	Price(t=1)	Put PayOff
MMM	100	100Put	98	2
NNN	50	50Put	49	1
OOO	30	30Put	27	3
PPP	20	20Put	21	0
RRR	50	50Put	53	0
SSS	50	50Put	51	0
DJ6	300	300Put	299	1

"On Average" the payout should equal the increased cost of this portfolio

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So why do this?

This strategy can be used as a hedge for idiosyncratic exposure in a bond portfolio.

This strategy, in the highly liquid short dated options is not overly expensive to execute, and if a portfolio were designed to match an underlying bond portfolio, there should be mitigation in the event of actual default

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Front Page News

NNN goes bankrupt after losing lawsuit to SSS, SSS shares soar!

Stock	Price(t=0)	Option	Price(t=1)	Put PayOff
MMM	100	100Put	98	2
NNN	50	50Put	0	50
OOO	30	30Put	27	3
PPP	20	20Put	21	0
RRR	50	50Put	53	0
SSS	50	50Put	65	0
DJ6	300	300Put	264	36

Payout $36, receive $55, net receive $19

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Investment Opportunity in this climate

Long Dispersion can used to mitigate concentration in a bond portfolio.

Recent market pressures have made dispersion not only cheap, but occasionally have a negative cost (theoretically impossible)

Why? Could be: Public trading slowed, Flash crash eliminated players, Insurers/Pensions still buying index options, Call over-write funds still selling individual stock options.

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Conclusion

For questions about this presentation, please contact me at:

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