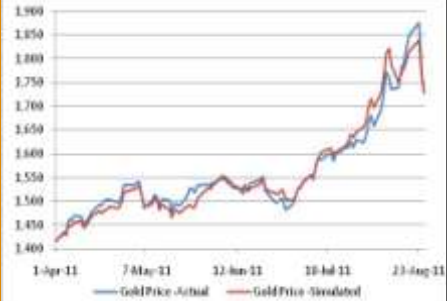


14<sup>th</sup> November 2011

## Commodity Trading

Ideas, Products, Risks, Limits



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## Jawwad Intro



**Fellow Society of Actuaries,  
Investments**

**MBA, Columbia Business School**

**19 years consulting: US, UK, ME &  
Pakistan**

**Risk Management, Product  
Development, Regulatory Reporting,  
Actuarial Practice  
Prefers - Jawwad**

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## Alchemy Intro

**Actuarial & Risk Advisory firm**

**8 years, 4 Markets**

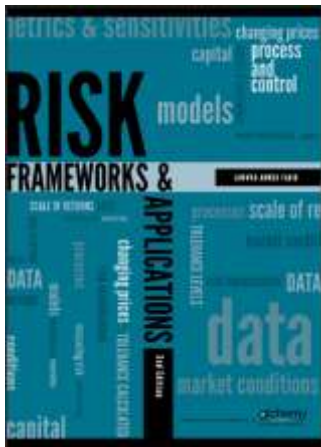
**Derivative & Risk Management models, ALM, ICAAP,  
Stress Testing, Financial Product Development,  
Training workshops**

**125th workshop - 1750 trained professionals**



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## Books and course portfolio



Welcome to our online Risk, Basel and Treasury courses collection



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What is this course about



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Price



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## Volatility



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## Models

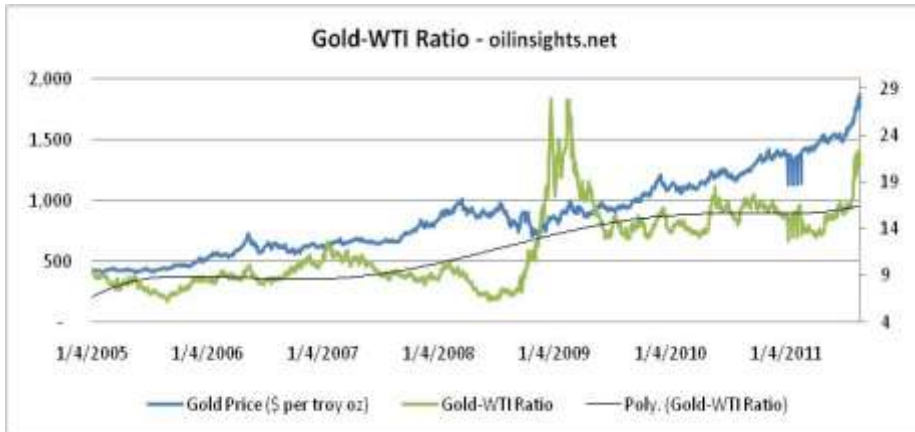


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## Relative Value

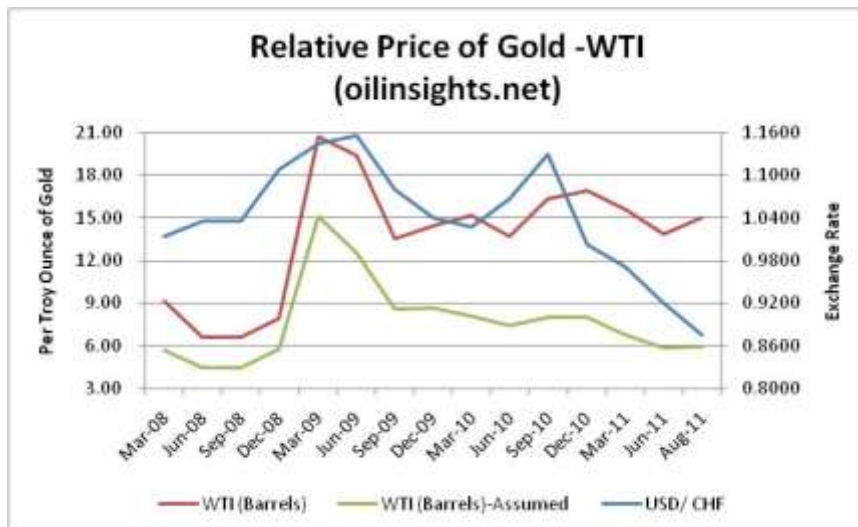


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## Relative Value - II

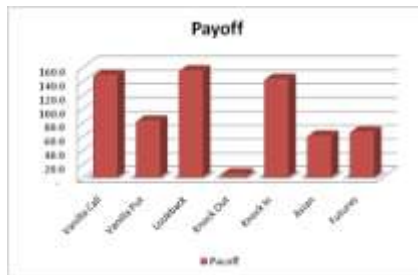
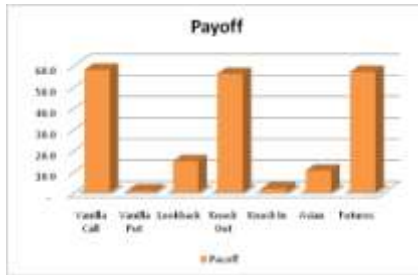


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## Products & Payoffs

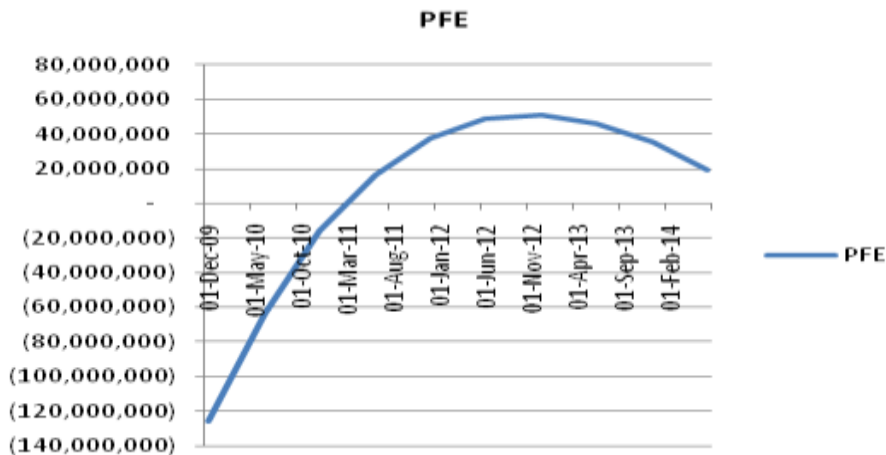


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## Limits



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## Action Plan – Session One

Volatility

- Trailing volatility

## Action Plan – Session Two

Working  
with Oil  
& Gold

- Fundamental models

Limits

- Limits allocation – PSR and PFE

# Distribution & Volatility



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# Sigma



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## Volatility

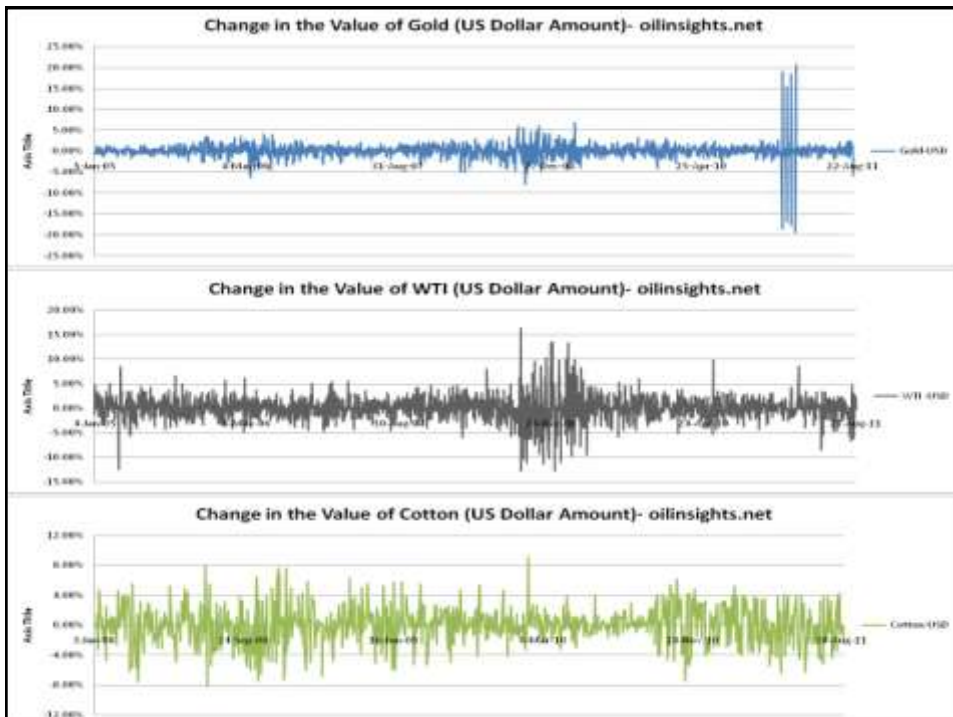
### Variance ==> expectations not met

- > Std-deviation ==> square root (Variance)
- > Dispersion, Diffusion
- > Volatility
- > Vol
- > Trading Vol
- > Implied Vol

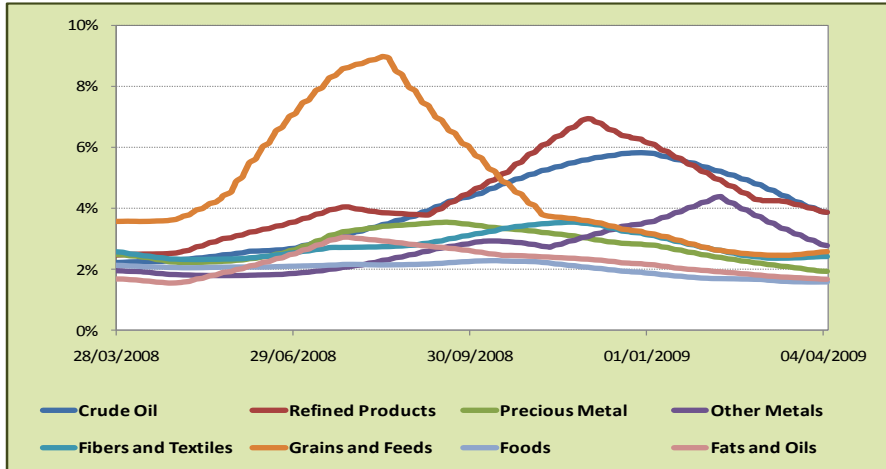
### Optionality - Volatility - Convexity



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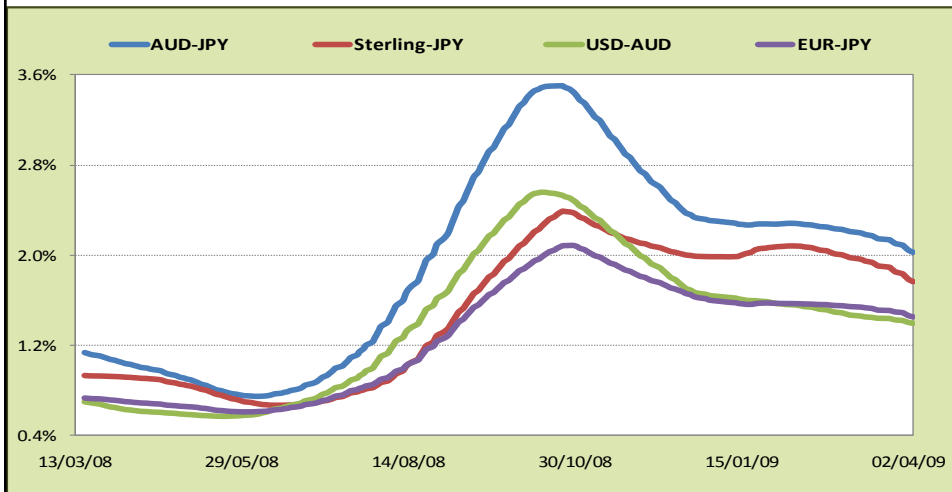


## Vol Trend



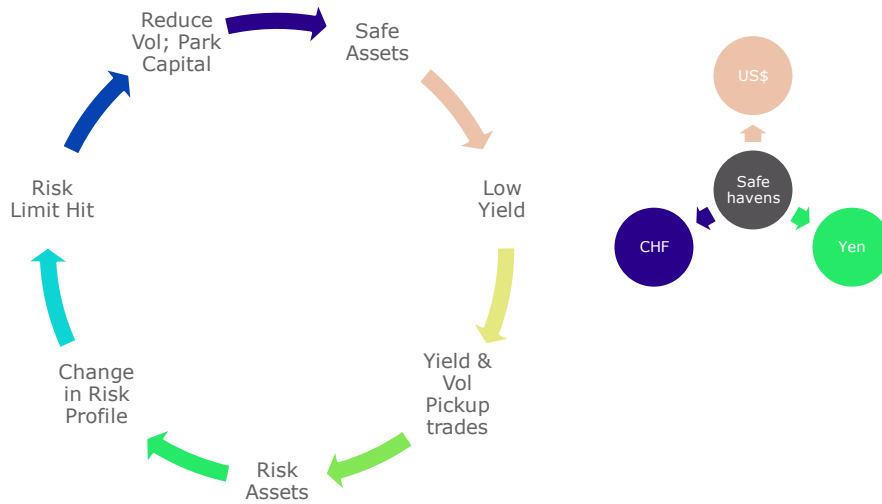
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## Lagged effects



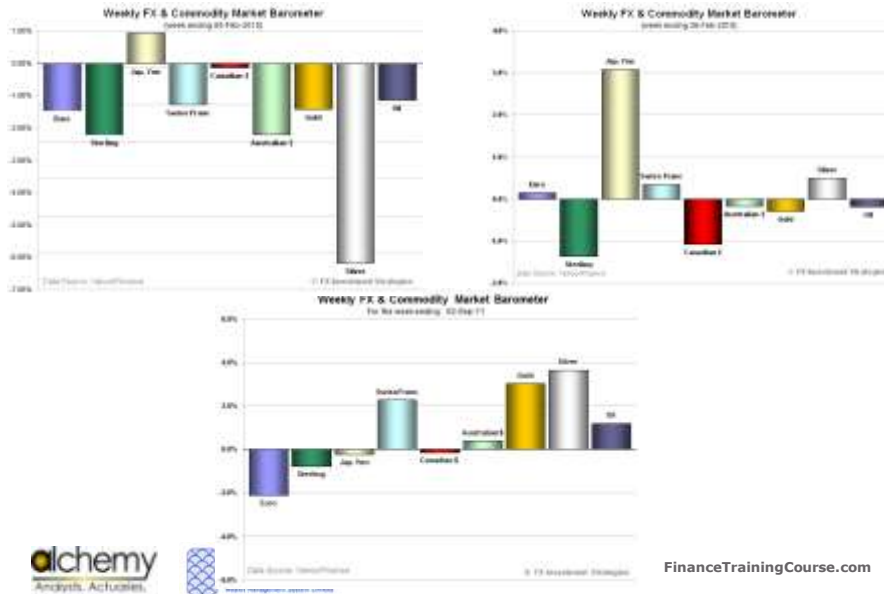
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# Flight to Safety cycle



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# Flight to Safety - II



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# Volatility Drag?

Vol = ?,  $r = ?$



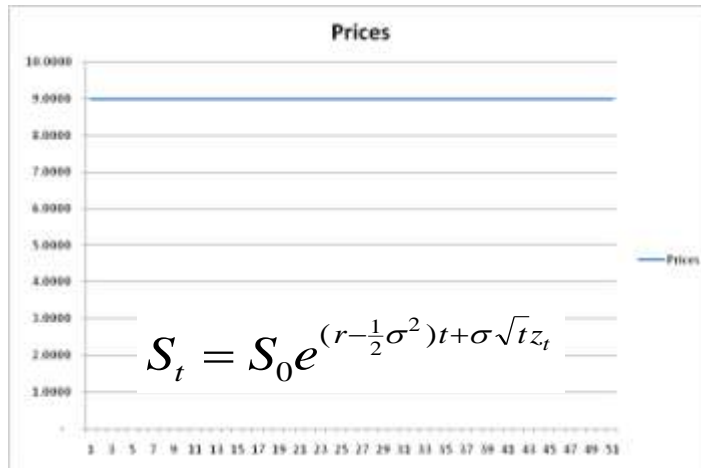
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# Thought Experiments?



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Vol = 0, r = 0



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Vol = 0, r = 1



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Vol = 0, r = ?



$$S_t = S_0 e^{(r - \frac{1}{2}\sigma^2)t + \sigma\sqrt{t}z_t}$$

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Vol = ?, r = 1



$$S_t = S_0 e^{(r - \frac{1}{2}\sigma^2)t + \sigma\sqrt{t}z_t}$$

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Vol = ?, r = 0



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$$S_t = S_0 e^{(r - \frac{1}{2}\sigma^2)t + \sigma\sqrt{t}z_t}$$

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Volatility drag

$$S_t = S_0 e^{(r - \frac{1}{2}\sigma^2)t + \sigma\sqrt{t}z_t}$$

$$\left(r - \frac{1}{2}\sigma^2\right)t$$

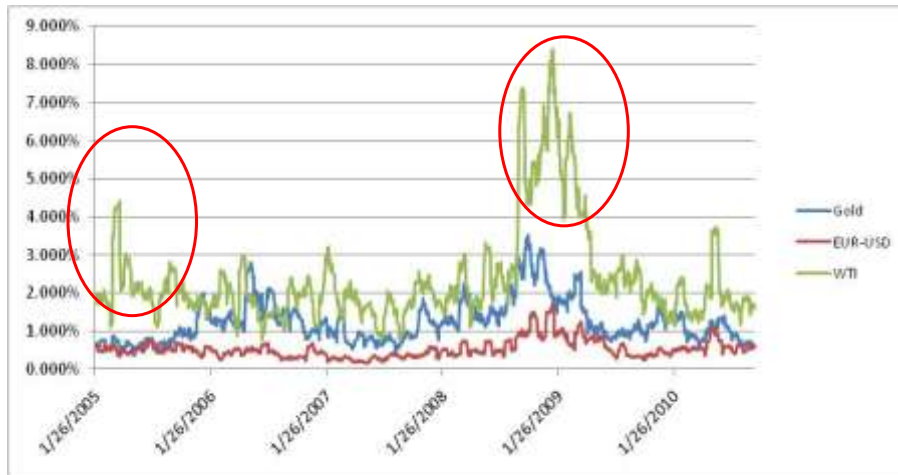
r	sigma	1/2 * sigma^2	vol-drag
1%	10%	0.5%	0.500%
1%	15%	1.1%	-0.125%
1%	20%	2.0%	-1.000%
1%	25%	3.1%	-2.125%
1%	30%	4.5%	-3.500%
1%	35%	6.1%	-5.125%

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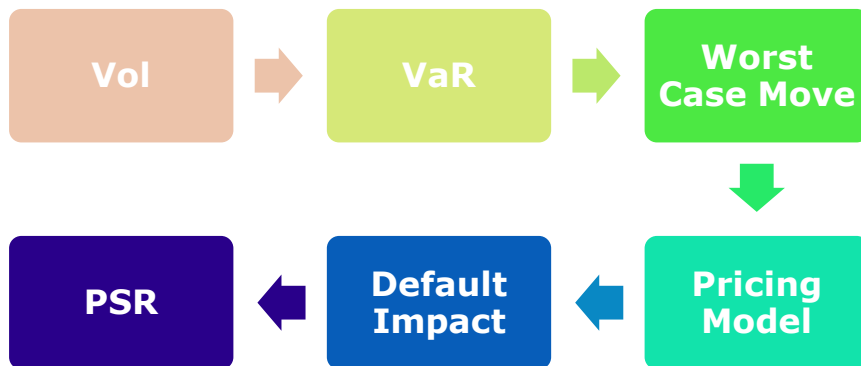
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## Trailing Volatilities



## Thought experiment - PSR Process





## Framing the problem – What is long term?



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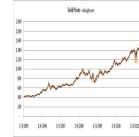
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## Framing the problem – What is long term?



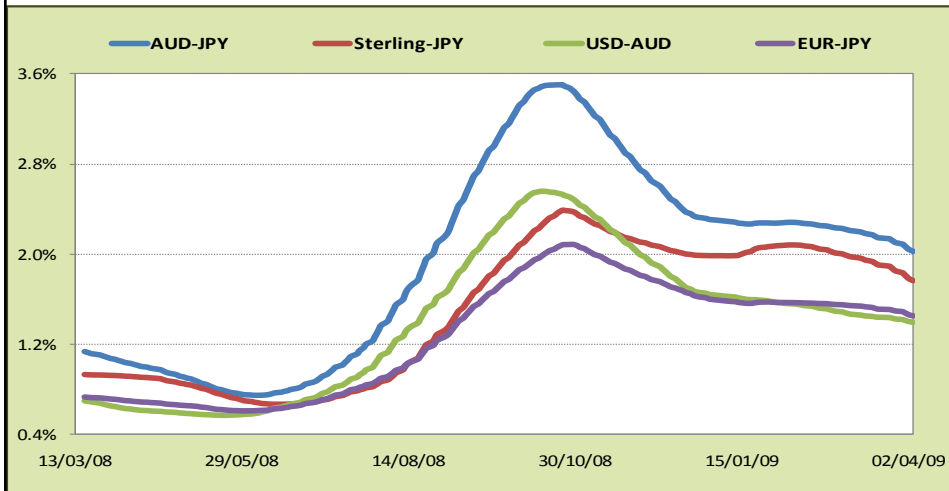
## Framing the problem – What is long term?



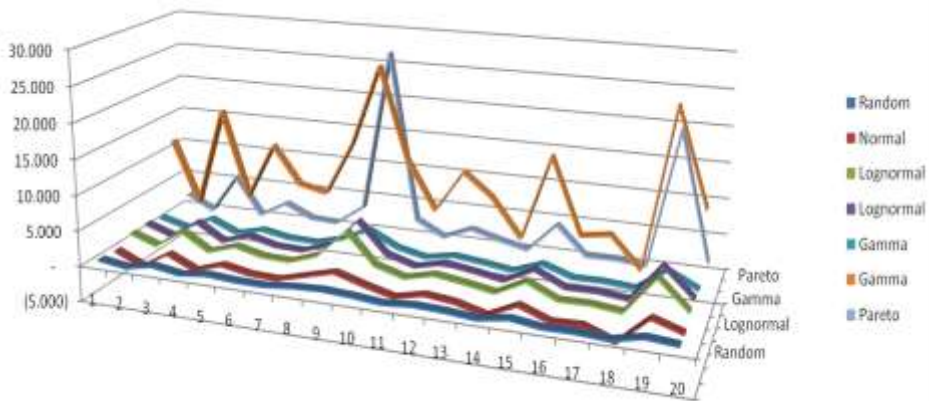
Historical Gold Prices - 1967 - 2011  
oilinsights.net



## Lagged effects



## Distributions - Simulations



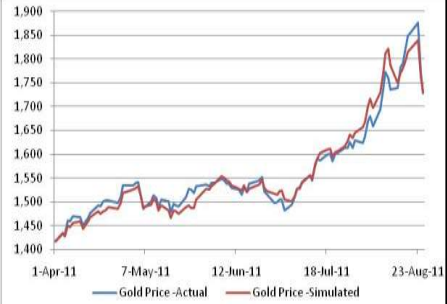
## Mindset – Distributions - Models

**ALL MODELS ARE WRONG  
SOME MODELS ARE MORE  
USEFUL THAN OTHERS**

Set date in Header & Footer

# Products & Models

Session II



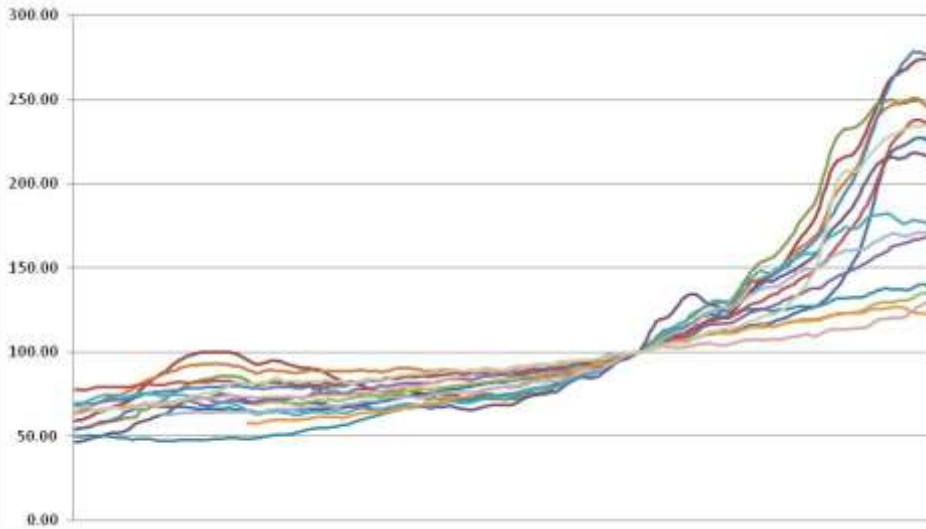
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# THOUGHT EXPERIMENTS



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## Is Gold safe now?

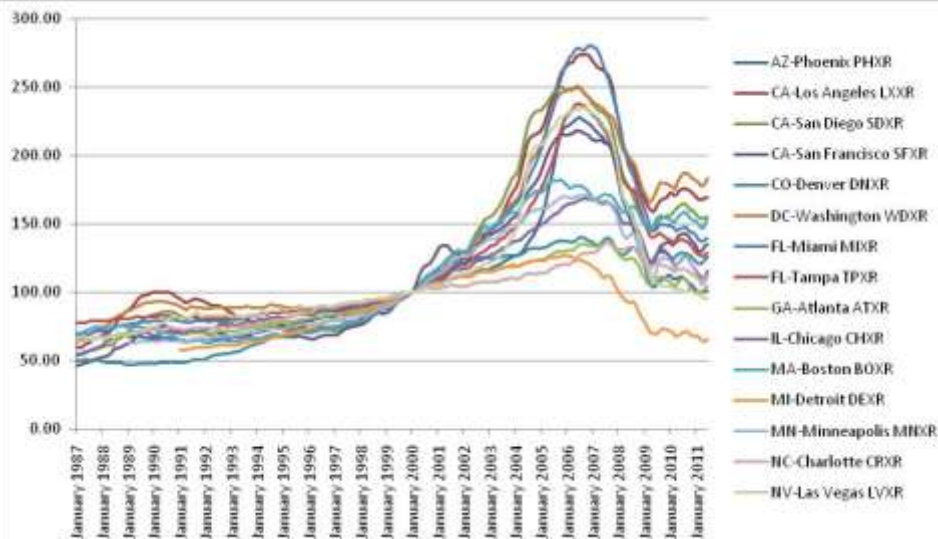


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## Is Gold safe now?

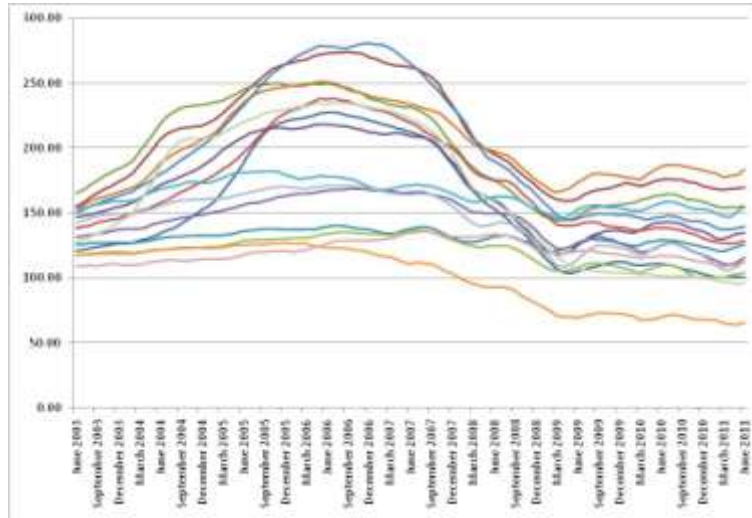


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## Bubble and after



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## Indicators?

7<sup>th</sup> September 2011 / Columbia Alumni List

I am seeking principals or brokerage houses who can handle a very large trade of gold from Asia. These are Gold Bars that carry the Credit Suisse hallmark that are in 1kg, 5kg, 10kg and 12.5kg bars and serial numbers can be provided. Credit Suisse Gold Bars are .9999 pure gold and the Credit Swiss Gold Bar has its weight, purity, content, and a unique serial number stamped on the bar.

Would prefer Comex member firms. The amount is large enough to ask for senior members/head of trading, or higher for this commodity.

Thanks,

John X  
Chief Executive Officer

494 8th Avenue, Suite 1403

New York, NY 10001

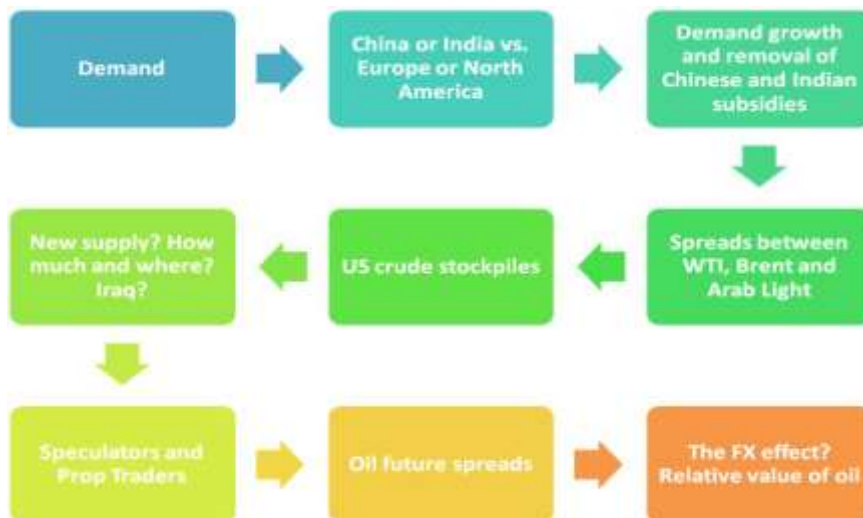
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# OIL & GOLD

## The baseline oil model



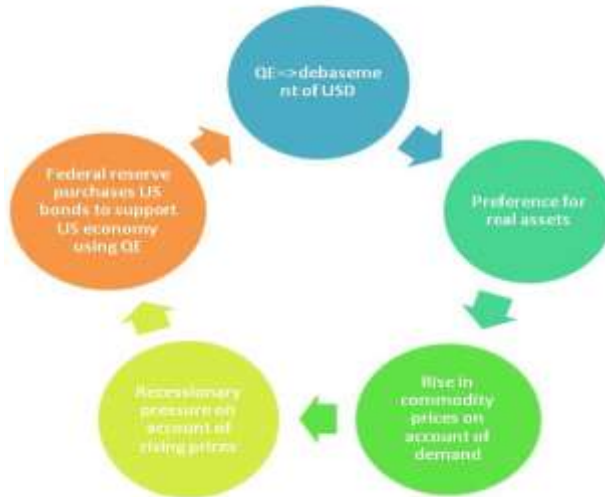


## Oil Model - drivers

Factors	Unit	CY08	Current	CY10P	CY11E	Trend
GDP	%		3.80%	3.80%	3.20%	Bullish
Crude Oil Demand	mbpd	86.6	86.1	86.3	87.15	Bullish
WTI-Brent Spread	USD/BBL	2.02	2	-	-	Neutral
WTI-AI Spread	USD/BBL	4.74	2	-	-	Bearish
Brent-AI Spread	USD/BBL	2.72	-0.03	-	-	Bearish
Non-OPEC Supply	mbpd	50.7	51.9	51.12	51	Bullish
OPEC Surplus Capacity	mbpd	1.35	6.47	5.5	5.7	Bearish
US Crude Inventory stockpile	mbpd	306	343	-	-	Bullish
% Change in US Crude Inventory stockpile	%	2%	2%	-	-	Bullish
Spot to 3-mth Future Spreads before USD 147/bbl	USD/BBL	-0.54	0.71	-	-	Neutral
Spot to 3-mth Future Spreads before USD 147/bbl	USD/BBL	-1.45	1.63	-	-	Neutral
Spot to 3-mth Future Spreads before USD 147/bbl	USD/BBL	-2.57	2.68	-	-	Neutral
USD to EURO	USD	1.47	1.36	1.59	1.86	Bullish



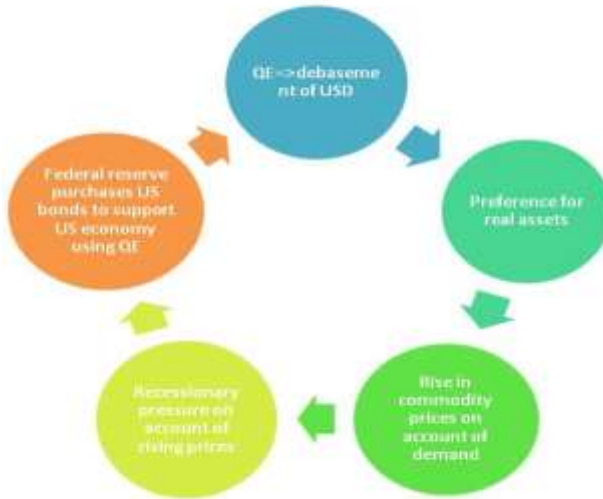
## Baseline Gold Model



## Reserve currency?



## Baseline Gold Model



## Reserve currency - II > ?

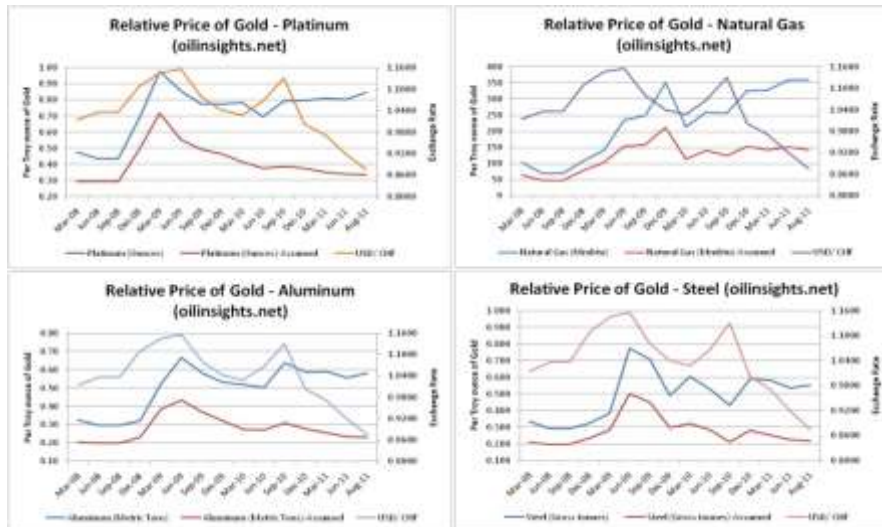


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## Return of relative value - I

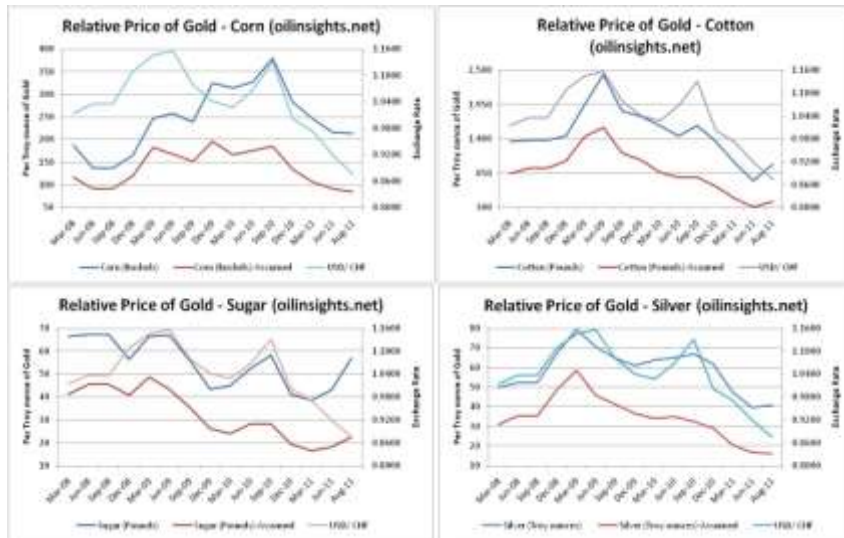


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## Return of relative value - II

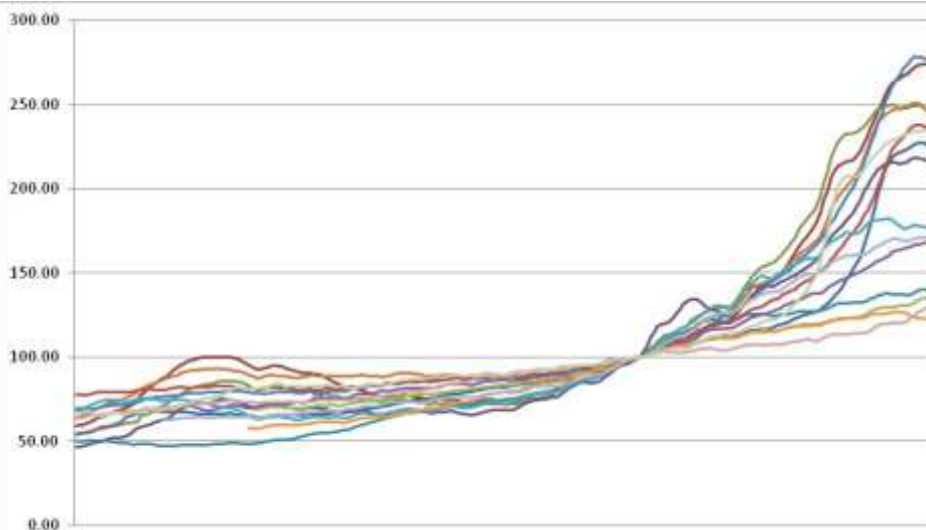


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## Is Gold safe now?

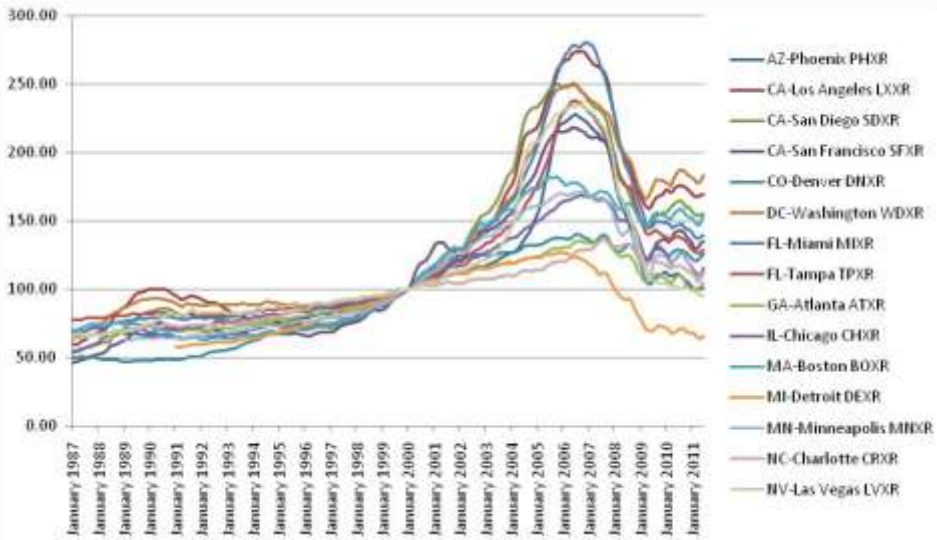


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## Is Gold safe now?

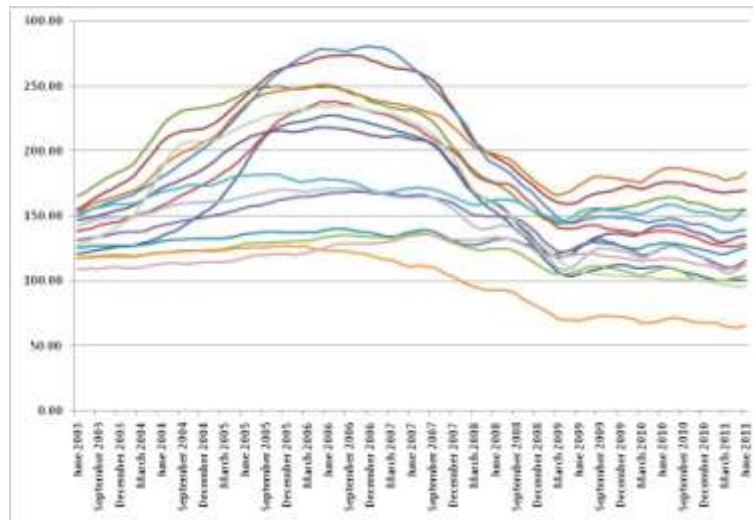


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## Bubble and after



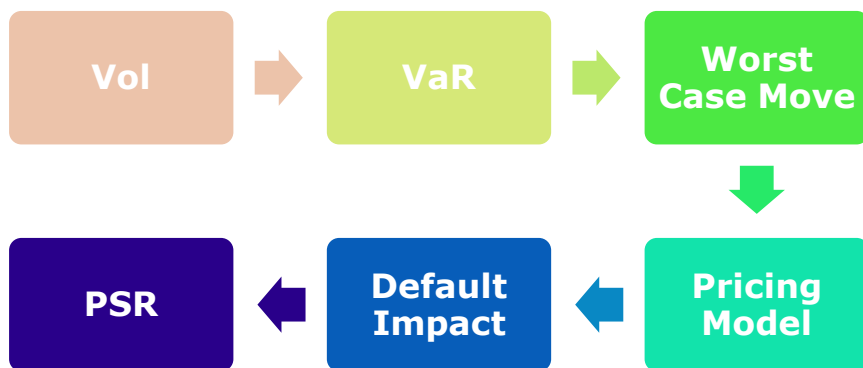
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# Limits


## Thought experiment - PSR Process



## PSR – Simple Example

Pre-Settlement Limit Example		
Product	Forward	Forward
Commodity	<b>Oil</b>	<b>Gold</b>
Volatility - annual	30%	25%
VaR Factor	3	3
VaR Percentile	99.9%	99.9%
Current Price	96	1800
Holding period	90	90
HP Vol	18%	15%
Worst Case Move	51	794



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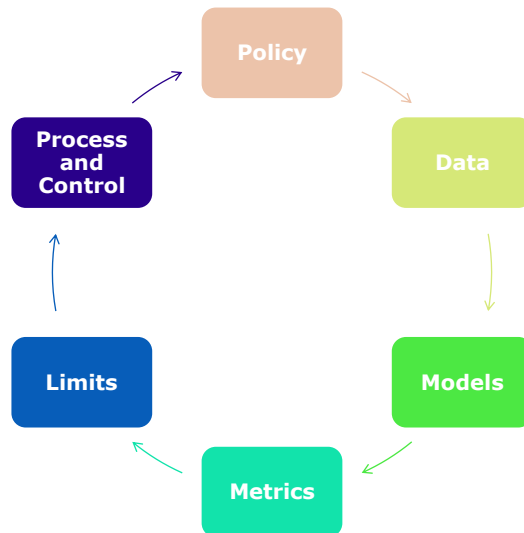


# Monthly Crude Oil Change



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# Issues



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# Sigma $a,b$



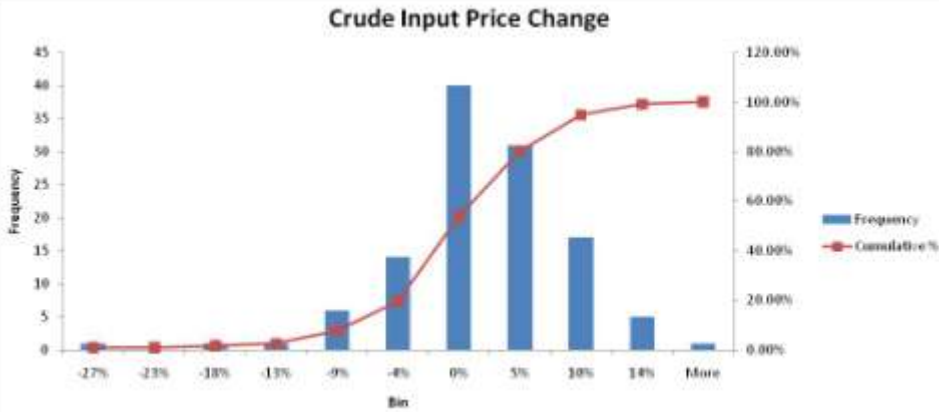
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# Value @ Risk



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## Monthly Crude Oil Change



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## Connections

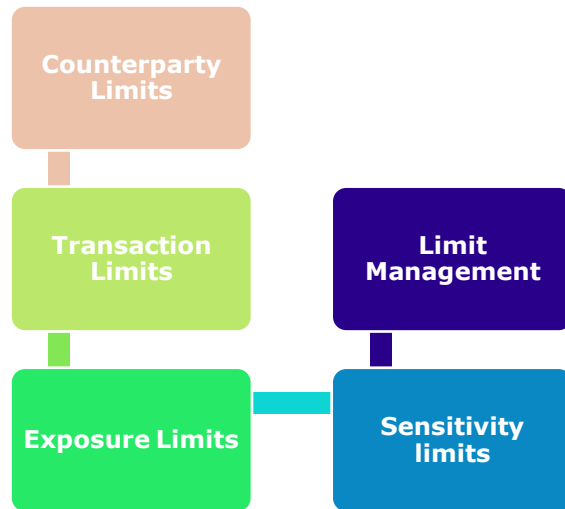
**Stop loss**  
**Book Size**  
**Slippage**  
**Loss Capital**

**Value at Risk**  
**Expectations**  
**Threshold**  
**Expected Loss**



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## Limit Management



## PRE SETTLEMENT RISK

## Counterparty Default

Agree to buy or sell something on future date

On settlement date, counterparty defaults

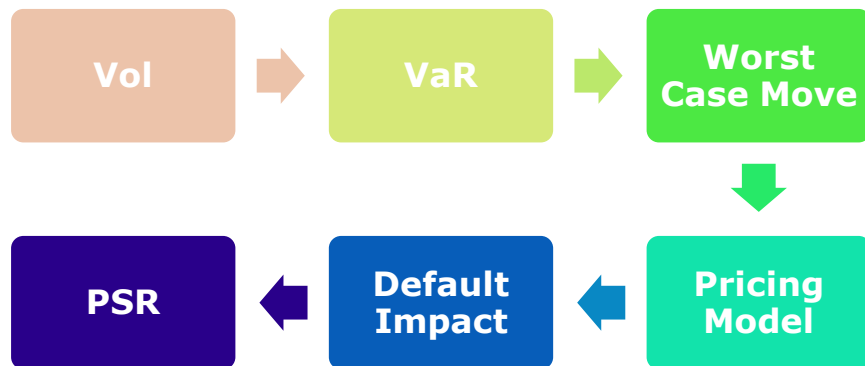
In case of default Buy or sell at market rate

Counterparty Credit Exposure & Limit



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## PSR Process



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# TRANSACTION & EXPOSURE LIMITS



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## Transaction & Exposure Limits

<b>Within a Trade</b>	• Max Ticket size
<b>Within a security</b>	• Max Product limit
<b>Within an operating cycle</b>	• Max Daily limits
<b>Within a tenor or maturity bucket</b>	• Max Tenor Exposure
<b>Within a risk classification or grade</b>	• Max Ticket Size



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# SENSITIVITY LIMITS



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## Sensitivity Limits

### To Exchange Rates

- Change in USD Equivalent Exposure
- Change in Position value per PiP

### To Interest Rates

- Duration, PVBP, Gaps, Interest Rate Mismatch

### To Volatility

- Vega, Change in value, Change in projected P&L, Gamma

### Earnings

- Change in projected earning, Net Interest Income or Earnings at Risk

### Shareholder Value

- Change in Income, Market Value of Equity or NPV

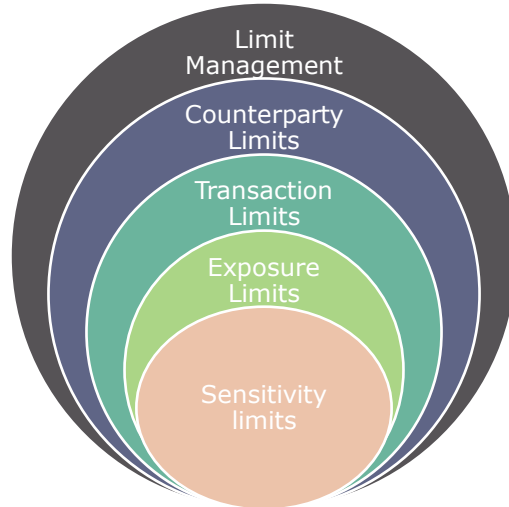
### Equity or Capital

- Maximum Loss, Impact of ALM choices on Capital



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## Limit Management



# Stop Loss



## Stop Loss Limit Process

Risk appetite

- Loss Capital Amount – depends on Expected and Minimum Rates of Return, Capital Amount

Target Stop loss limit

- applicable for given period

Book Size

- Allocation of book size to individual business/ investment lines

Actual stop loss limits

- individual lines for given period



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What is this course about

Price

Risk

Value

Products

Limits



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## Q&A

### Contact

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[www.alchemya.com](http://www.alchemya.com)

<http://financetrainingcourse.com>

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