WHAT'S NEW IN V-LAB

Robert Engle

Director: Volatility Institute at NYU Stern

April 25,2014

Volatility Conference on "Liquidity"

WHAT'S NEW

- Almost twice as many assets
- Updating on a rolling basis closer to the market close for global assets.
- A New Liquidity Page

V-Lab
BETA

Volatility Institute | NYU Stern

Display: Basic

Documentation » Analysis List »

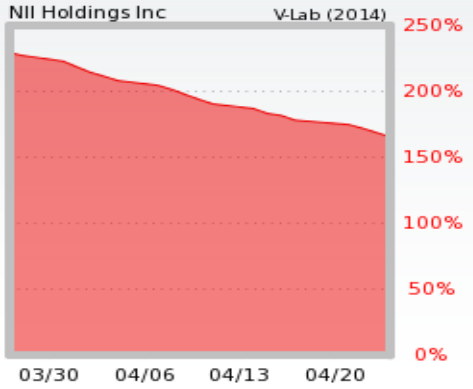
NYU STERN
THE VOLATILITY INSTITUTE

Volatility Analysis | GJR-GARCH | Type ticker or search (Wildcard=%) | Go

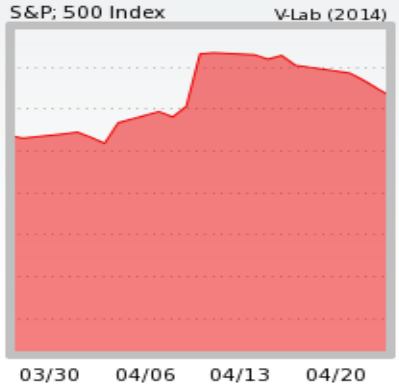
V-LAB ANALYSIS OVERVIEW

VOLATILITY | CORRELATIONS | SYSTEMIC RISK | LONG RUN VALUE AT RISK | LIQUIDITY

HOT	Volatility	Change
NIHD:US	165.61	-3.30
SIR:AU	149.44	-0.01
000760:KS	111.44	-7.66
ETAK:US	108.07	-1.56
HEATING	**Volatility**	**Change**
033180:KS	55.62	+20.52
BHSEASI:IND	21.70	+14.63
001230:KS	47.74	+13.96
XLNX:US	35.63	+13.35



MARKET SUMMARY	Volatility	Change
SPX	12.61	-0.38
UKX	11.26	-0.07
DAX	18.54	-0.80
CAC	15.17	-0.21
EUR	5.49	-0.03
JPY	7.53	-0.03
MXWD	8.98	-0.29
EEM	16.21	-0.48



The Volatility Laboratory (V-Lab) provides real time measurement, modeling and forecasting of financial volatility, correlations and risk for a wide spectrum of assets. V-Lab blends together both classic models as well as some of the latest advances proposed in the financial econometrics literature. The aim of the website is to provide real time evidence on market dynamics for researchers, regulators, and practitioners.

The V-Lab is currently running 28862 analyses on 6052 datasets producing a total of 63637 series each day!

An Introduction to Financial Volatility: Professor Rob Engle's video lectures on the Financial Times

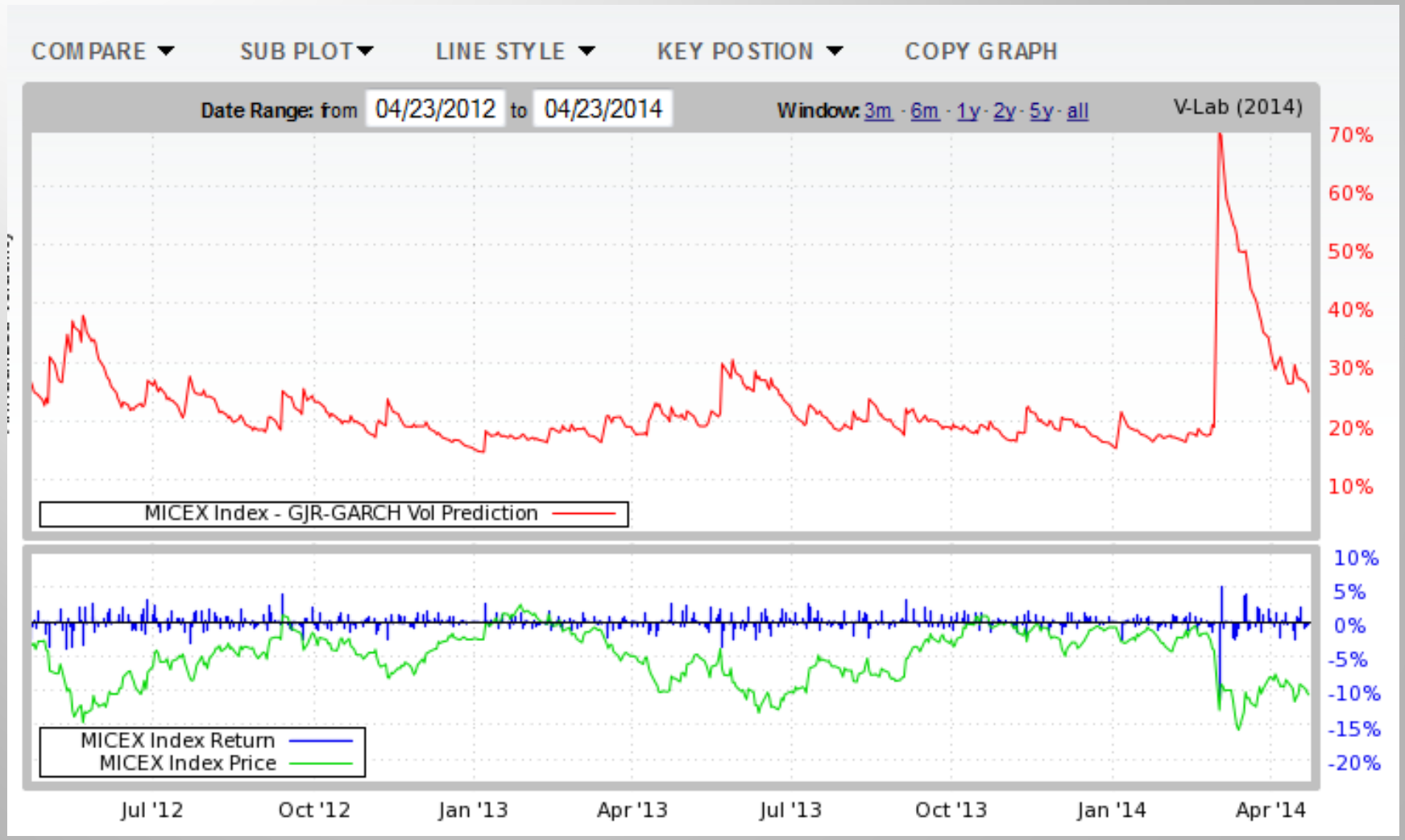
V-Lab Related Documents

- Dynamic Conditional Beta
  Engle (2014)
- AEA Paper - Capital Shortfall: A New Approach to Ranking and Regulating Systemic Risks
  Acharya, Engle, and Richardson (2012)
- Prof. Rob Engle Discusses Risk with Tom Keene and Ken Pruitt of Bloomberg Surveillance

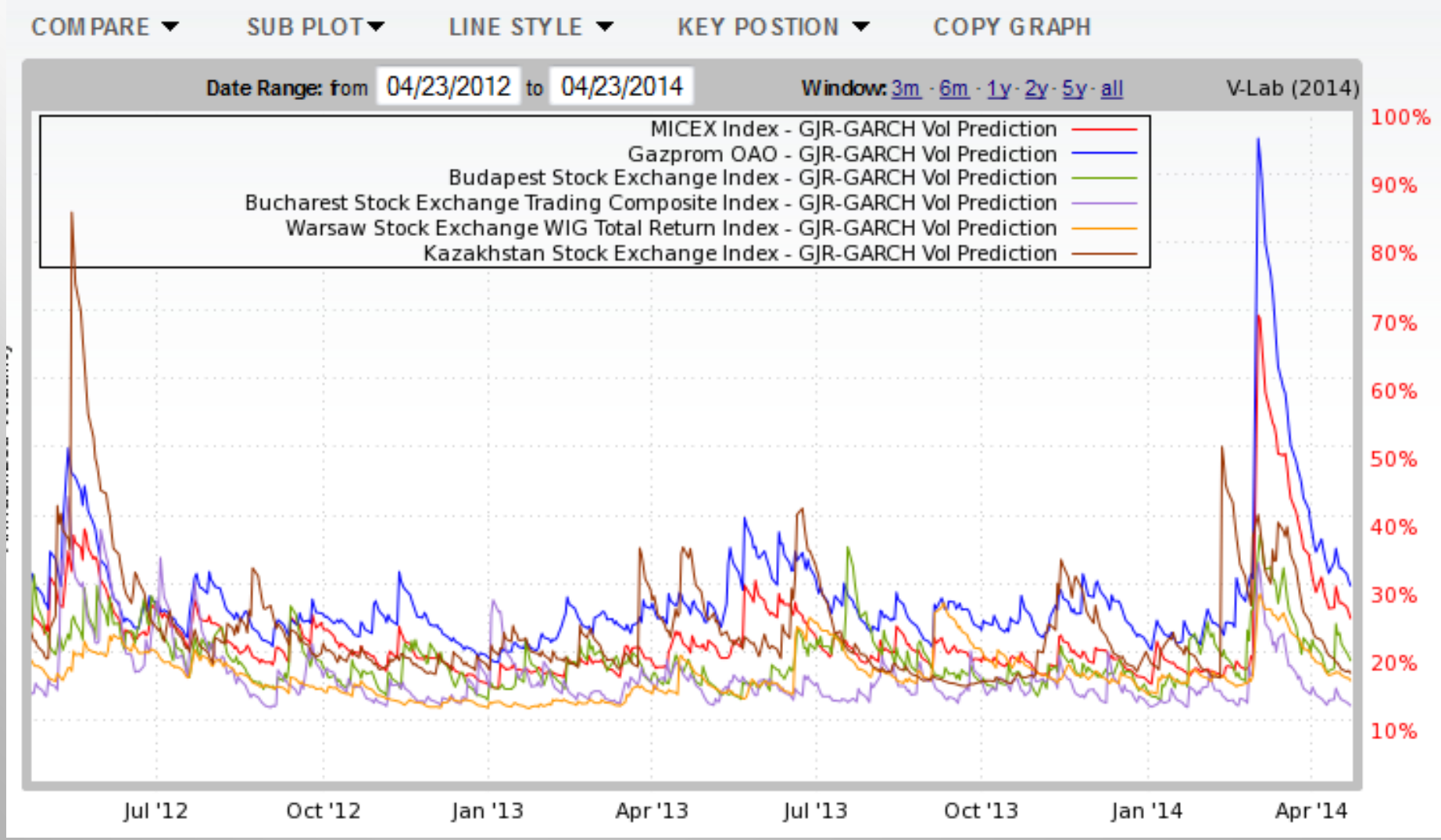
What's in V-Lab?

Asset Class	Number of Assets
International Equities	2633
Equities	770
Credit Default Swaps	292
Equity Indices	174
Currencies	103
Commodities	59
Volatility Indices	14
Equity Sectors	9
Treasuries	8
Corporate Bonds	6
Real Estate	3

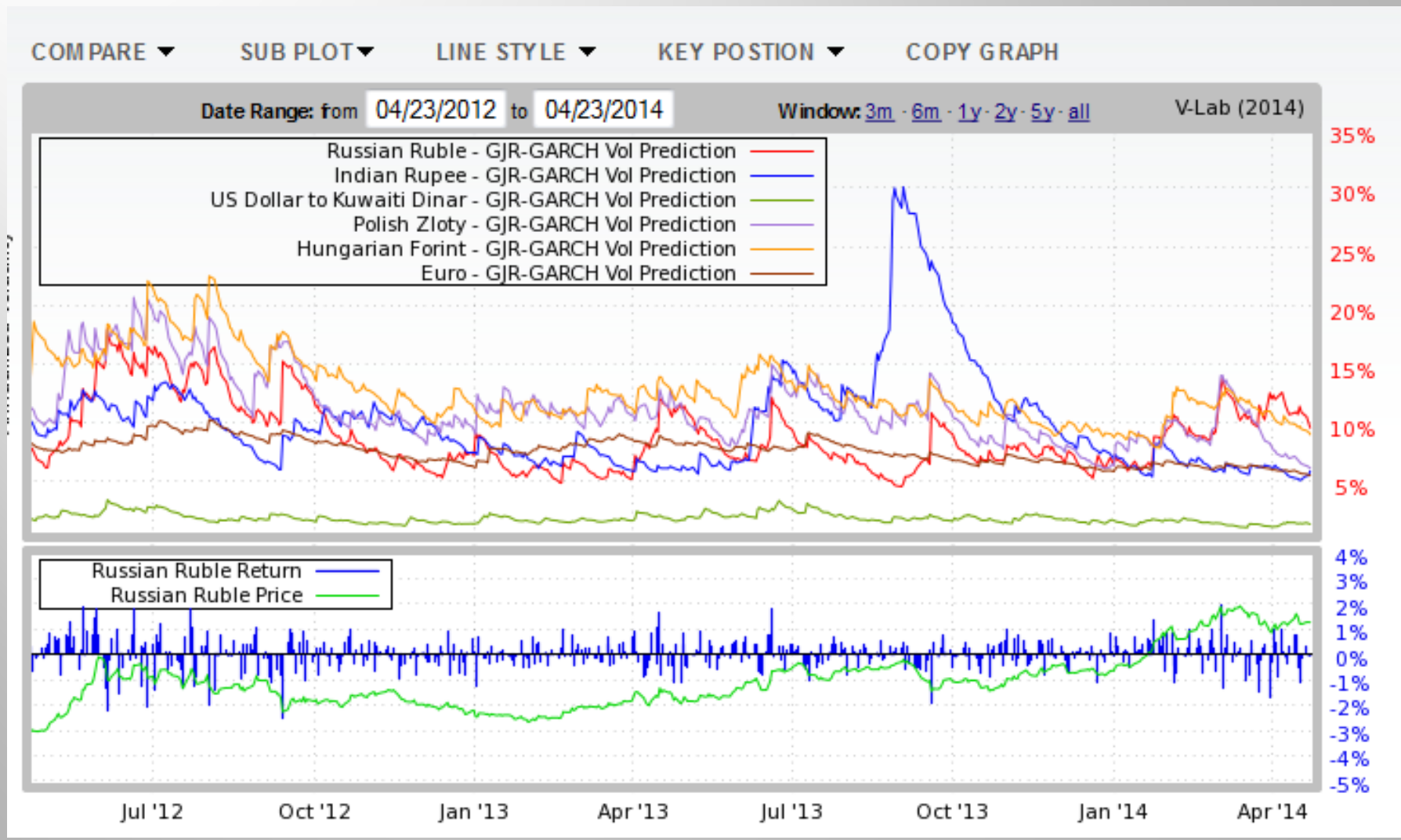
What's new in Volatility?



RUSSIA'S NEIGHBORS

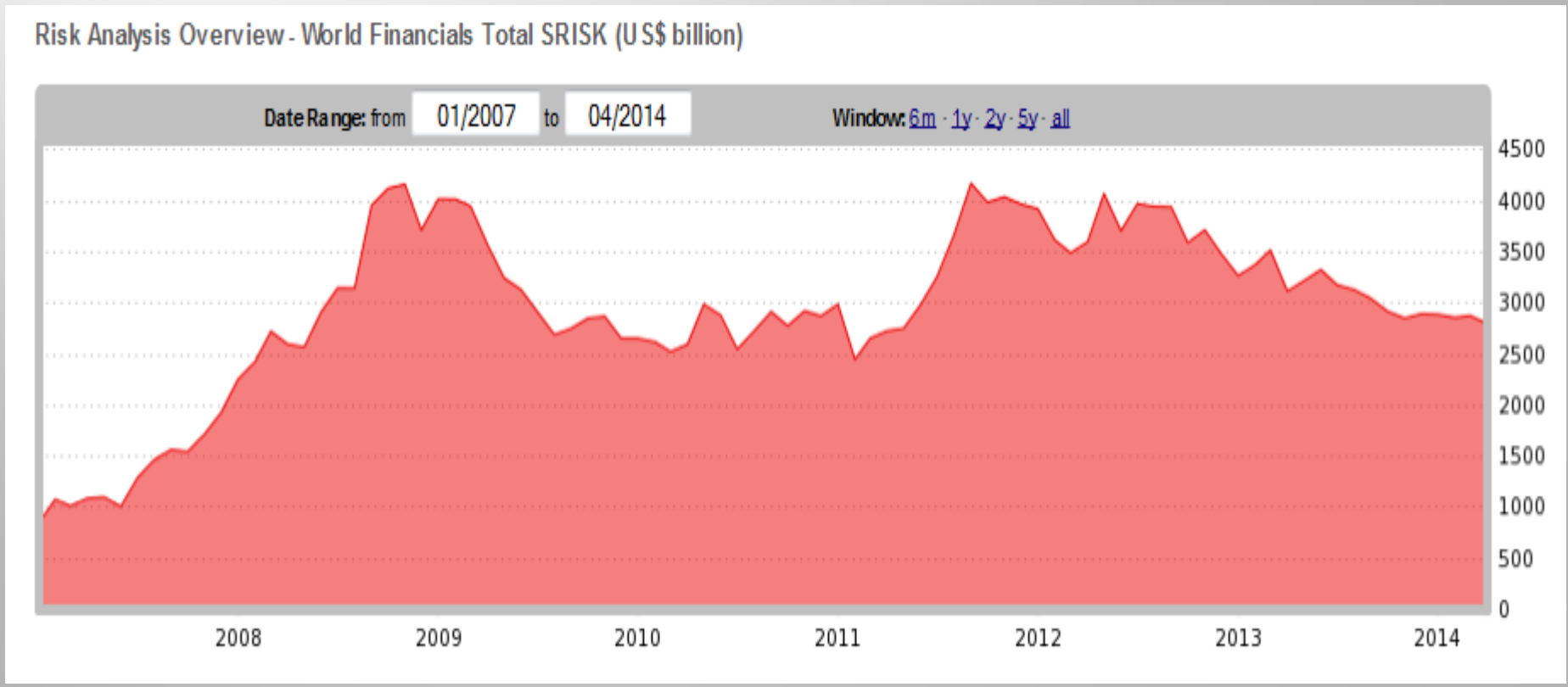


CURRENCY VOLS

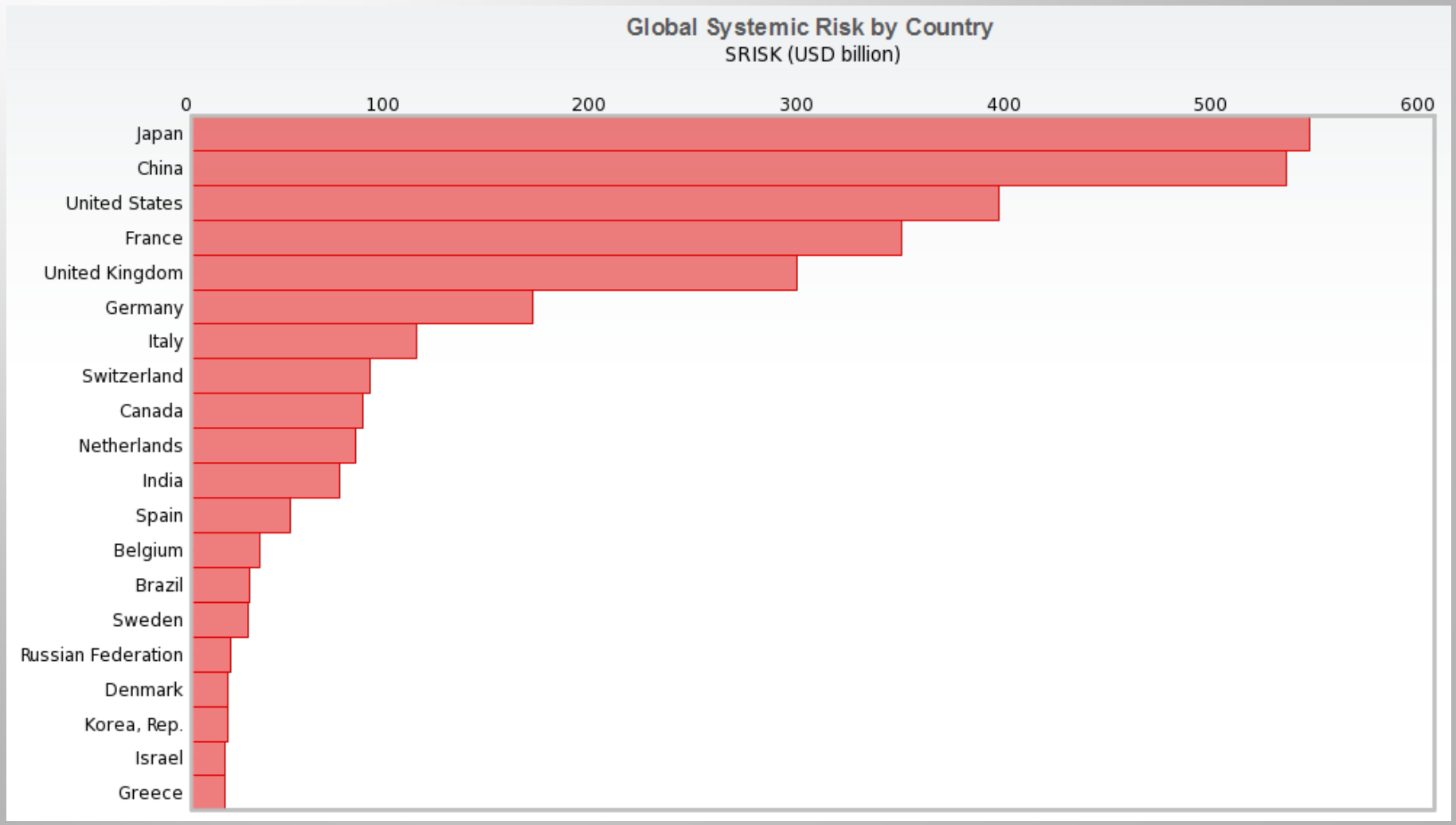


SYSTEMIC RISK

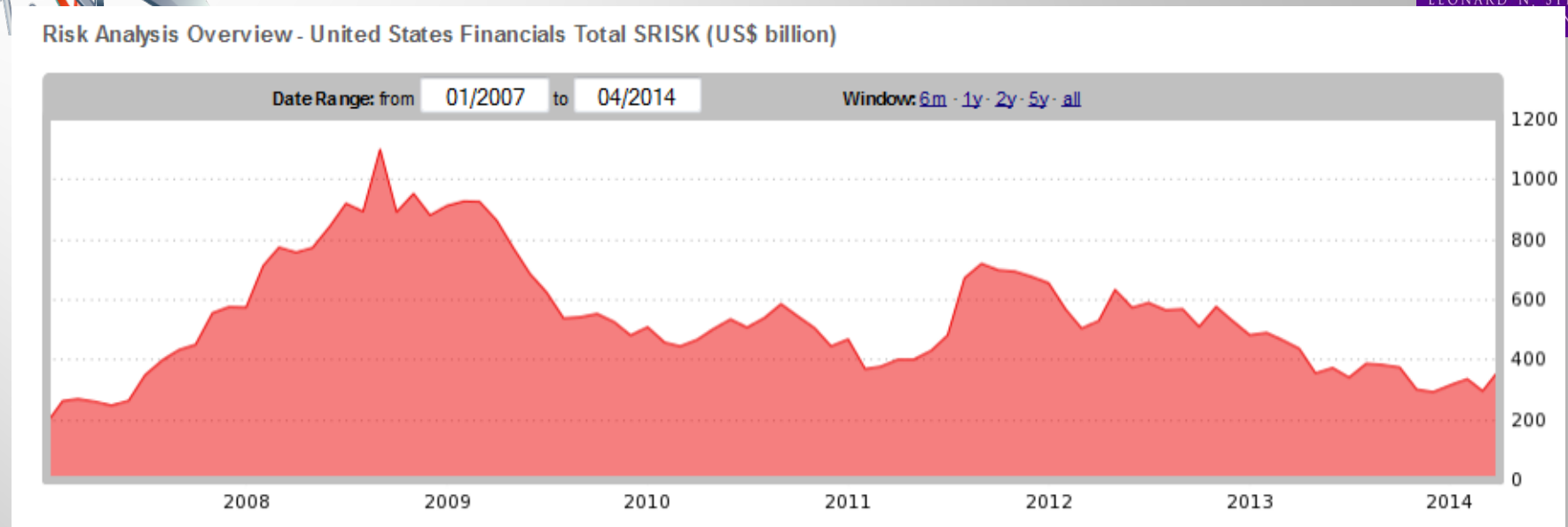
- How much would it cost to bail out the global financial system if we have another financial crisis?

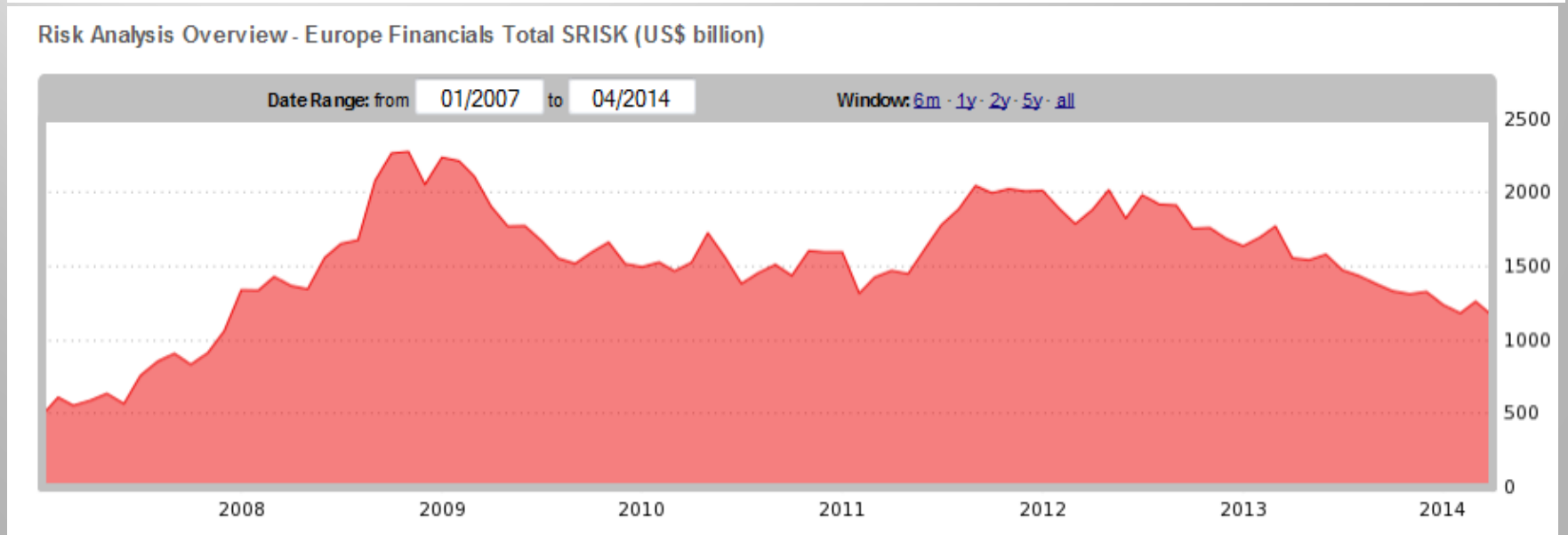


WHERE IS THE RISK?



US AND EUROPE





CHINA AND JAPAN

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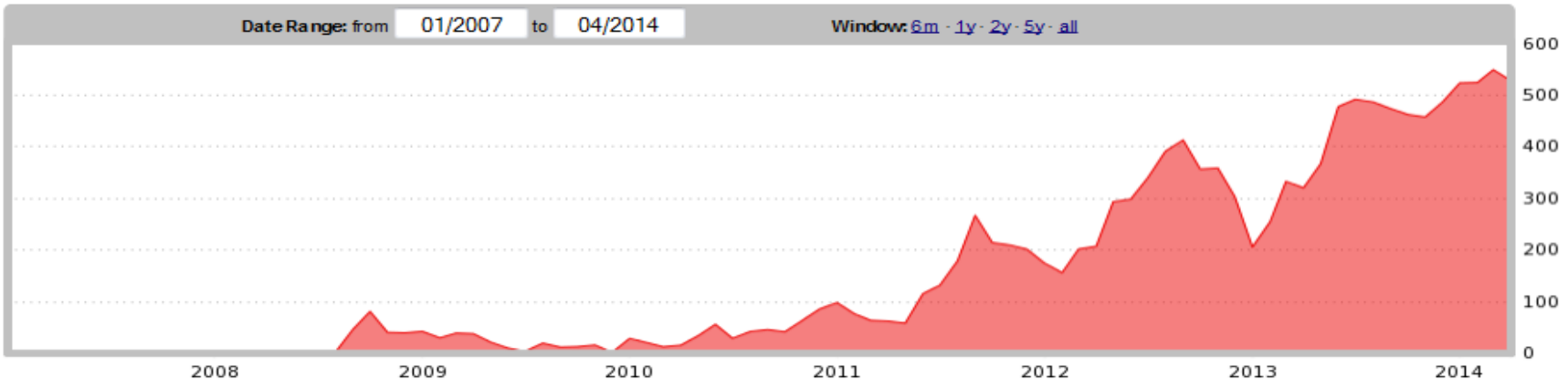
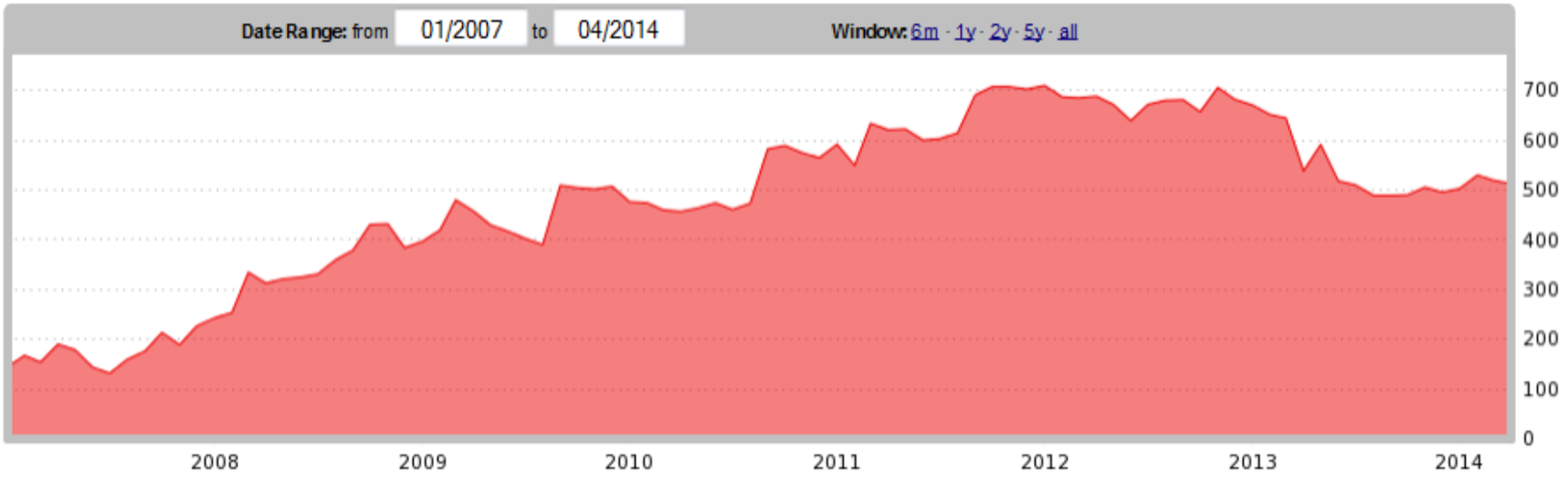
Risk Analysis Overview - China Financials Total SRISK (US$ billion)



Risk Analysis Overview - Japan Financials Total SRISK (US$ billion)



WELCOME PAGE

- VOLATILITY
- CORRELATION
- SYSTEMIC RISK
- LONG RUN VALUE AT RISK
- LIQUIDITY

The Liquidity Team

- Rob Capellini - V-LAB Director WOW!!
- Robert Ferstenberg – Consultant Extraordinary
- Emil Siriwardane – PhD. in process – Great Expectations
- Yakov Amihud – All World Liquidity Team
- Joel Hasbrouck – All World Liquidity Team
- Viral Acharya and Matt Richardson – the Systemic Squad


WHERE IS THE LIQUIDITY?

LIQUIDITY PAGE OF V-LAB

- Today I will show you our progress in adding a liquidity page to V-LAB.
- Initially this will be confined to US and some foreign equities.
- Eventually it will include other asset classes and reasonable foreign coverage.

GOALS OF LIQUIDITY

- Monitor levels of illiquidity in equities and other assets for evidence that financial markets are freezing.
- Examine fluctuations in liquidity estimates for individual assets and the market.
- Estimate expected execution costs including price impact over time and assets using publicly available data.

MEASURING LIQUIDITY

- Amihud's ILLIQ

$$ILLIQ = \frac{|return|}{dollar\ \ volume}$$

- Bid Ask relative spread

$$\frac{Ask - Bid}{(Ask + Bid)/2}$$

- Price Impact for buy (- for Sell)

$$Expected\ \ Shortfall = \frac{P^{Execution} - P^{Arrival}}{P^{Arrival}}$$

FORECASTING LIQUIDITY

- For economic decision making, we need forecasts of liquidity.
  - We might be scheduling trades or
  - we might be forming portfolios with certain liquidity properties.
  - We might be liquidating positions or
  - backtesting a trading strategy.
  - We might be setting clearing margins
- We might want to know the distribution of liquidity measures, not just the expected value.

HOW CAN WE FORECAST?

- How can we forecast something we cannot measure?
- How can we forecast something that cannot be anticipated? When liquidity disappears, it surprises all agents.
- These arguments can also be made about volatility and there are some close connections.

FORECASTING ILLIQ

- Forecasting non-negative processes – can you be sure you won't predict a negative value when it should be impossible?
- MEM –Multiplicative Error Model, Engle 2002

$$y_t = \mu_t \nu_t,\ E(\nu_t) = 1,\ \nu \sim [0,\infty),\ \mu_t(\theta) \geq 0 \forall\, \theta \in \Theta$$

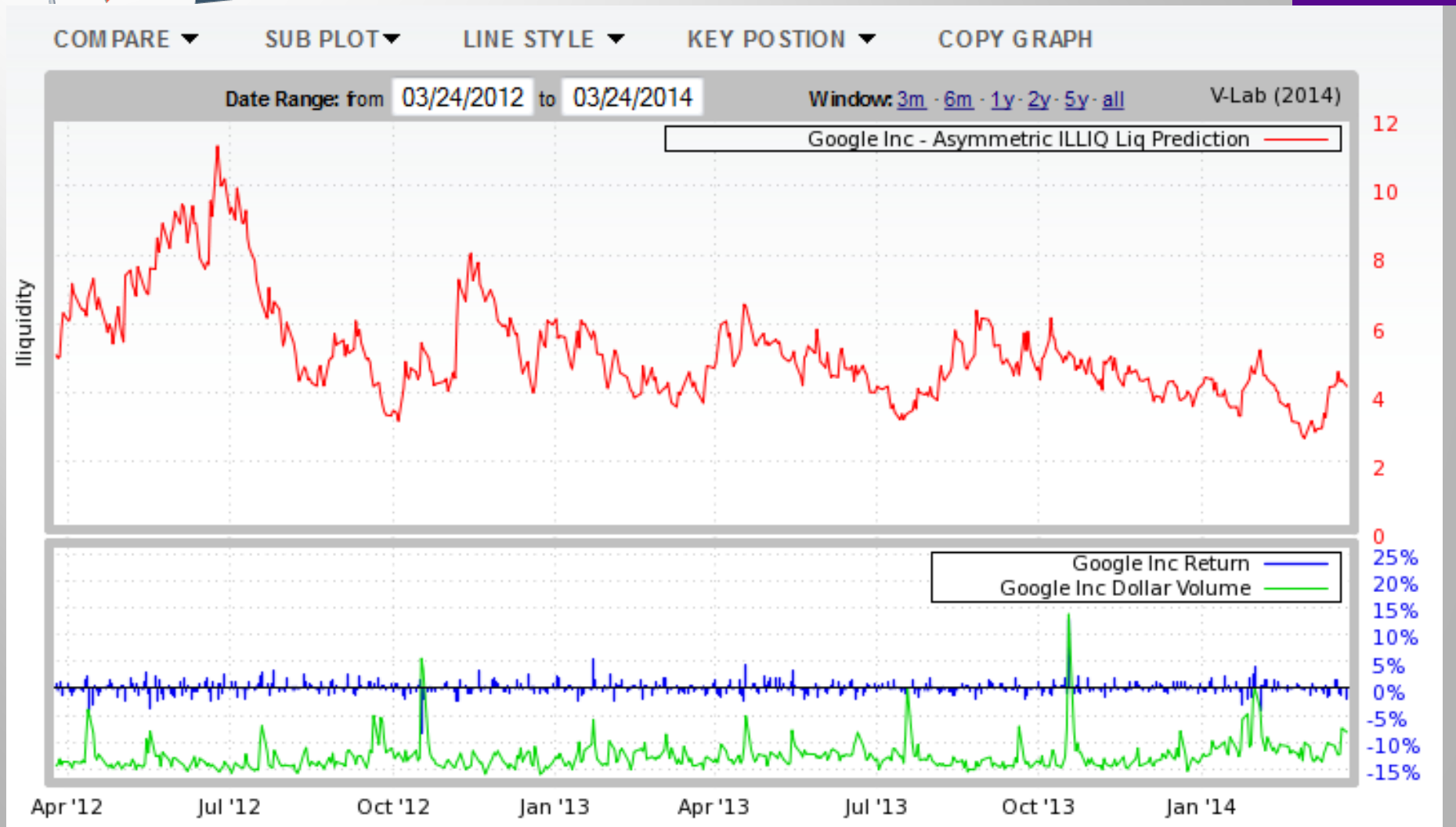
- For example: $\nu_t \sim X_1^2,\ \mu_t = \omega + \alpha y_{t-1} + \beta \mu_{t-1}$

- We can see that the square root of y is a normal garch. Parameter estimation is by MLE and will be the same for the whole family of Gamma distributions. Qmle for other distributions.

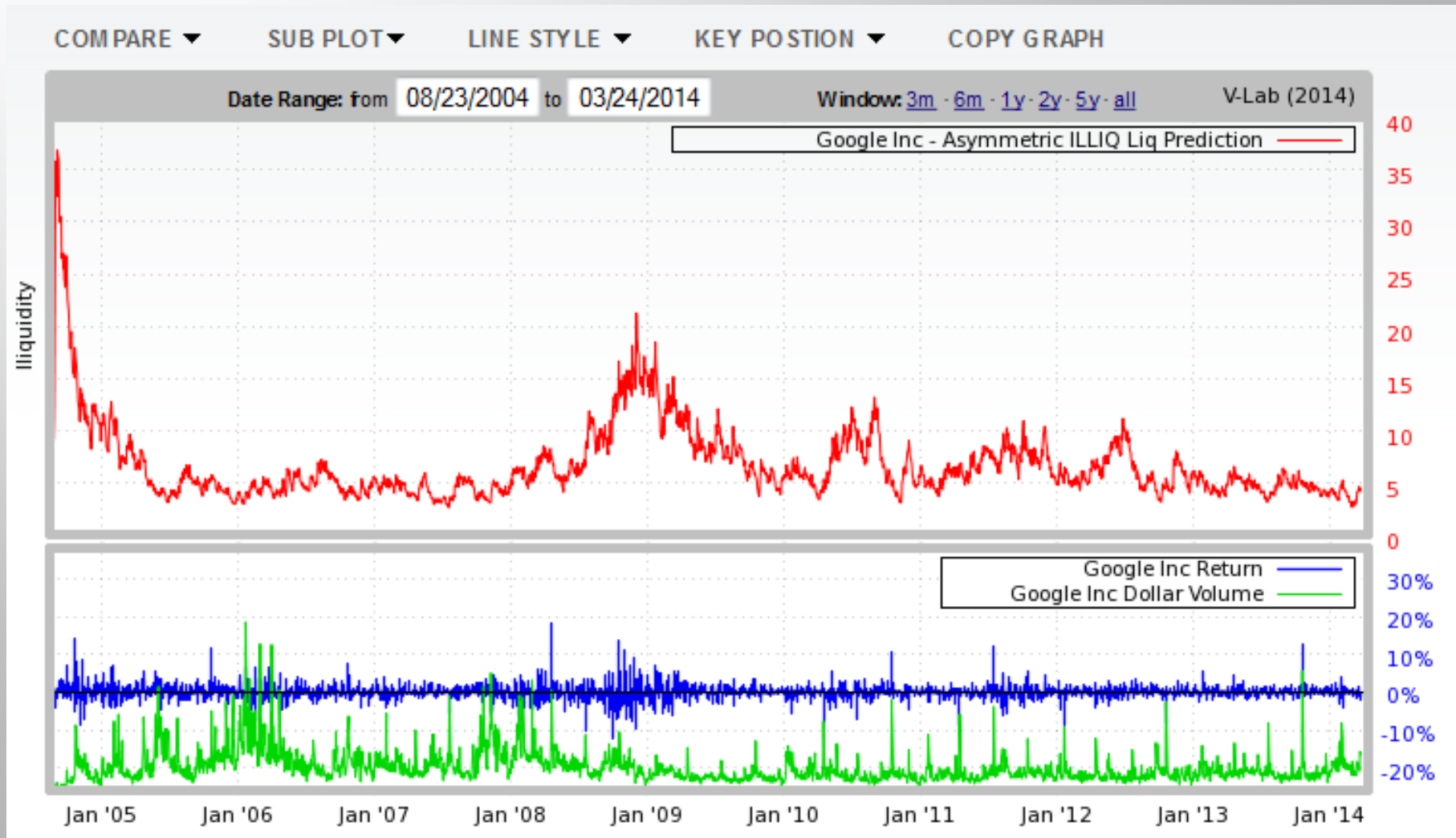
HOW TO DO IT

- Take square root of ILLIQ and estimate it with a GARCH program. The estimate of the conditional variance is the mean of ILLIQ.
- Use Spline GARCH to adjust for non-stationary distribution of ILLIQ
- Use signed square root of ILLIQ with asymmetric GARCH models such as GJR to show asymmetry in ILLIQ.
- UNITS: *basis points of return per million $ of volume.*

RESULTS


COMPARE
SUB PLOT
LINE STYLE
KEY POSTION
COPY GRAPH
Date Range: from 03/24/2012 to 03/24/2014
Window: 3m · 6m · 1y · 2y · 5y · all
V-Lab (2014)
Google Inc - Asymmetric ILLIQ Liq Prediction
Illiquidity
12
10
8
6
4
2
0
Google Inc Return
Google Inc Dollar Volume
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
Apr '12
Jul '12
Oct '12
Jan '13
Apr '13
Jul '13
Oct '13
Jan '14

GOOGLE SINCE IPO



FORD


COMPARE
SUB PLOT
LINE STYLE
KEY POSTION
COPY GRAPH
Date Range: from 01/03/1990 to 03/24/2014
Window: 3m · 6m · 1y · 2y · 5y · all
V-Lab (2014)
Illiquidity
800
700
600
500
400
300
200
100
0
Ford Motor Co - Spline ILLIQ Liq Prediction
Ford Motor Co - Spline ILLIQ Liq Trend
40%
20%
0%
-20%
-40%
-60%
Ford Motor Co Return
Ford Motor Co Dollar Volume
Jan '91
Jan '94
Jan '97
Jan '00
Jan '03
Jan '06
Jan '09
Jan '12

Blackstone Group

Parameters Blackstone

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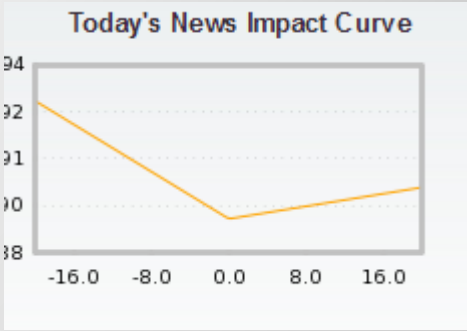
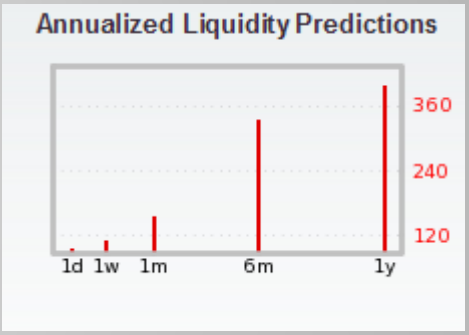
Parameter Estimates

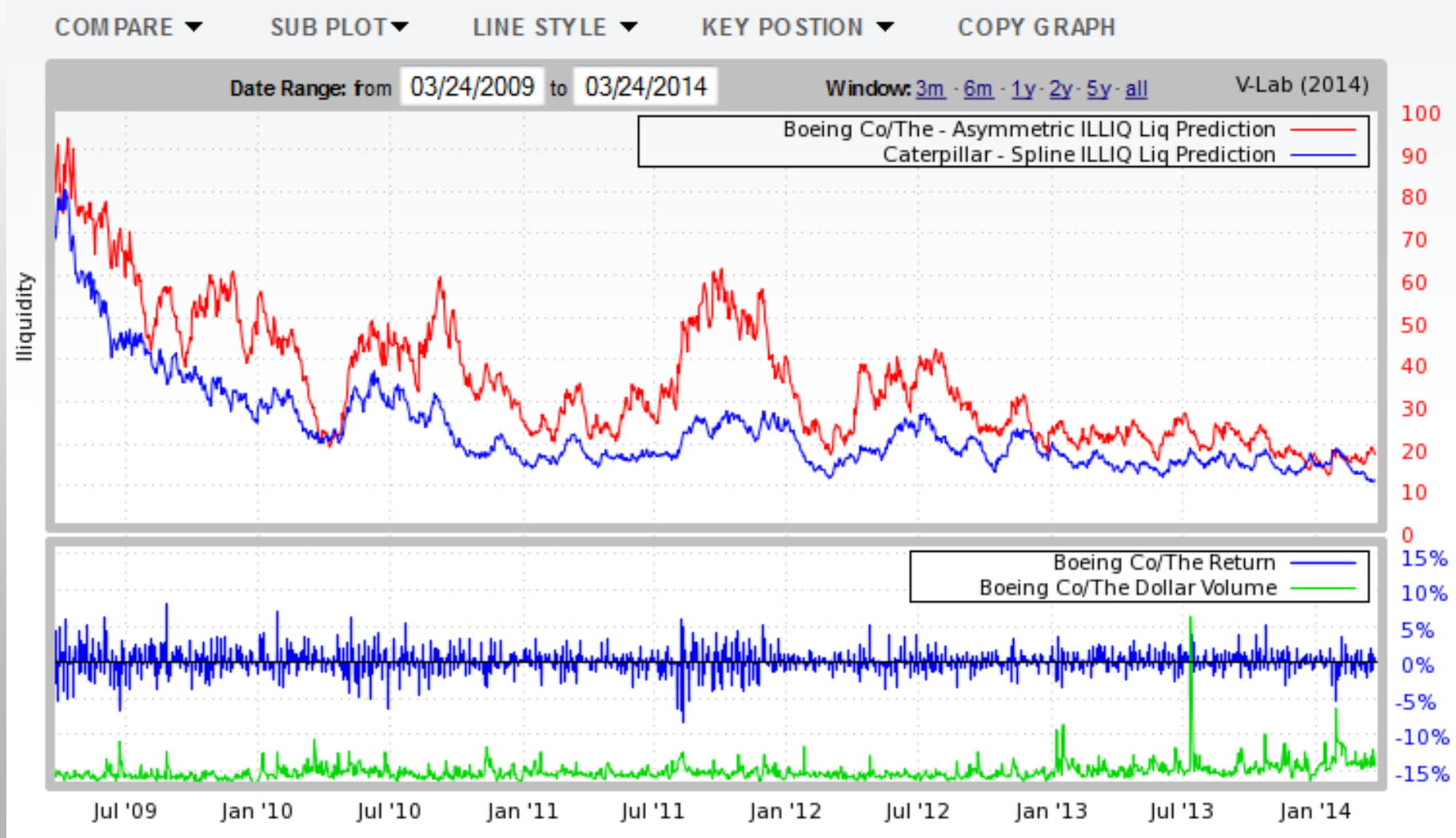
	param	t-stat
ω	4.40620	13.945
α	0.04464	11.000
β	0.88366	255.394
γ	0.12235	16.811

Estimation period: 2007-06-22 to 2014-03-24

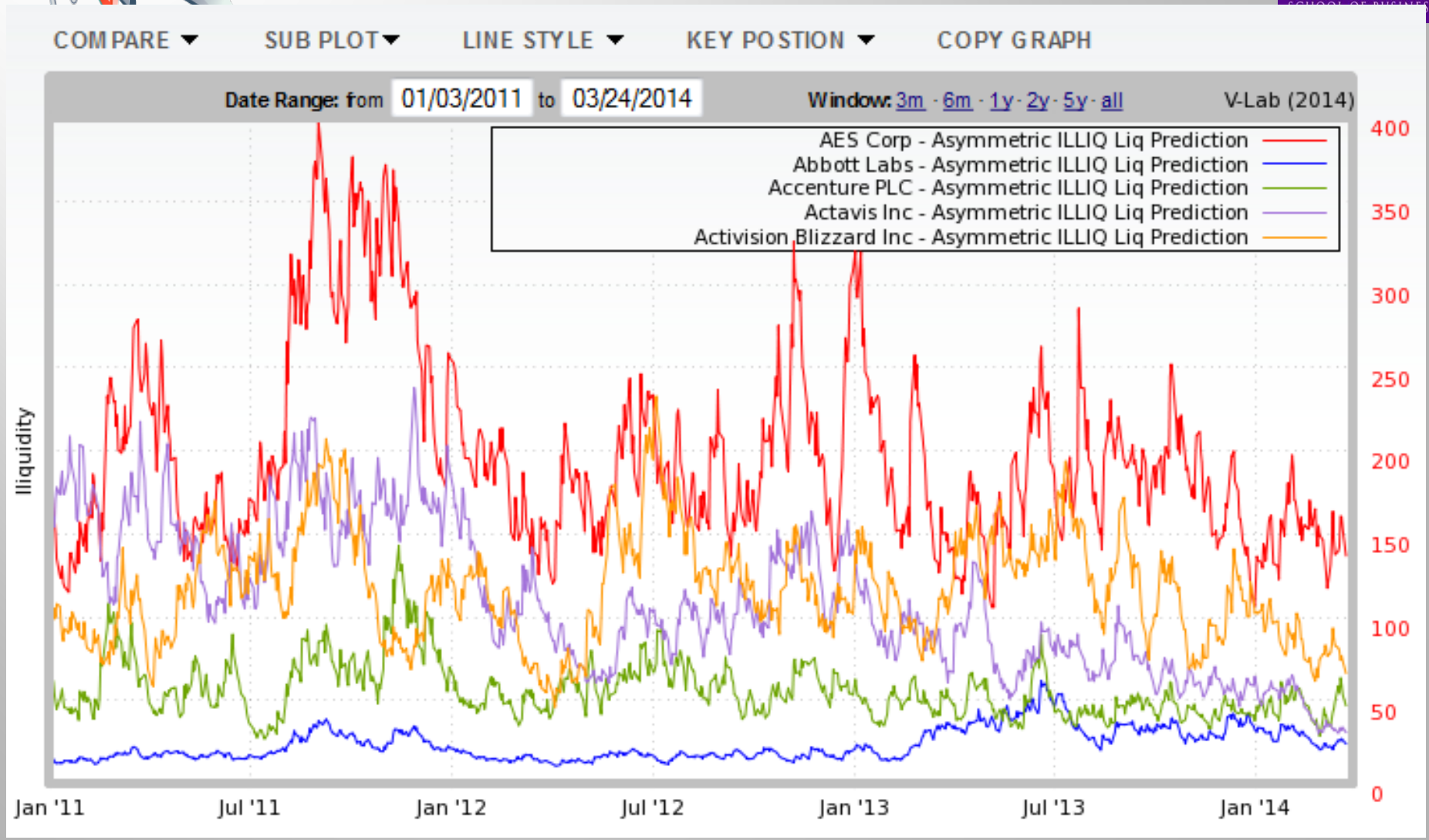




BOEING AND CATERPILLAR



SOME MORE NAMES



EXECUTION COST

- Does ILLIQ really measure execution cost? Can we trade a million $ of some asset for ILLIQ bp?
- Some evidence from other measures.
- What is the Bid Ask spread as a percent cost? This is a minimum for the cost of trading.

OTHER MEASURES

- Engle Ferstenberg and Russell(2012) JPM

$$ExpectedShortfall_i = e^{X_i\beta} + e^{X_i\gamma}\varepsilon_i$$

- In this model the data are trades and the Xs are characteristics such as size, volume, volatility and spread and how the trades are executed.
- The model is estimated on a year of trades from a big broker prior to the financial crisis.
- With this model we can estimate the cost of a 1%ADV or a $1Million trade.

GRINOLD AND KAHN

- "Active Portfolio Management: A Quantitative Approach for Producing Superior Returns and Controlling Risk",1994

$$ExpectedShortfall = \beta_1 BASpread +$$

$$+\beta_2 Volatility * \sqrt{Size / AverageDailyVolume}$$

- This model is also typically estimated using actual trades.
- We will approximate it by thinking of a trading day. Often trades go primarily one way during a day so it may be useful to think of it as one large trade.

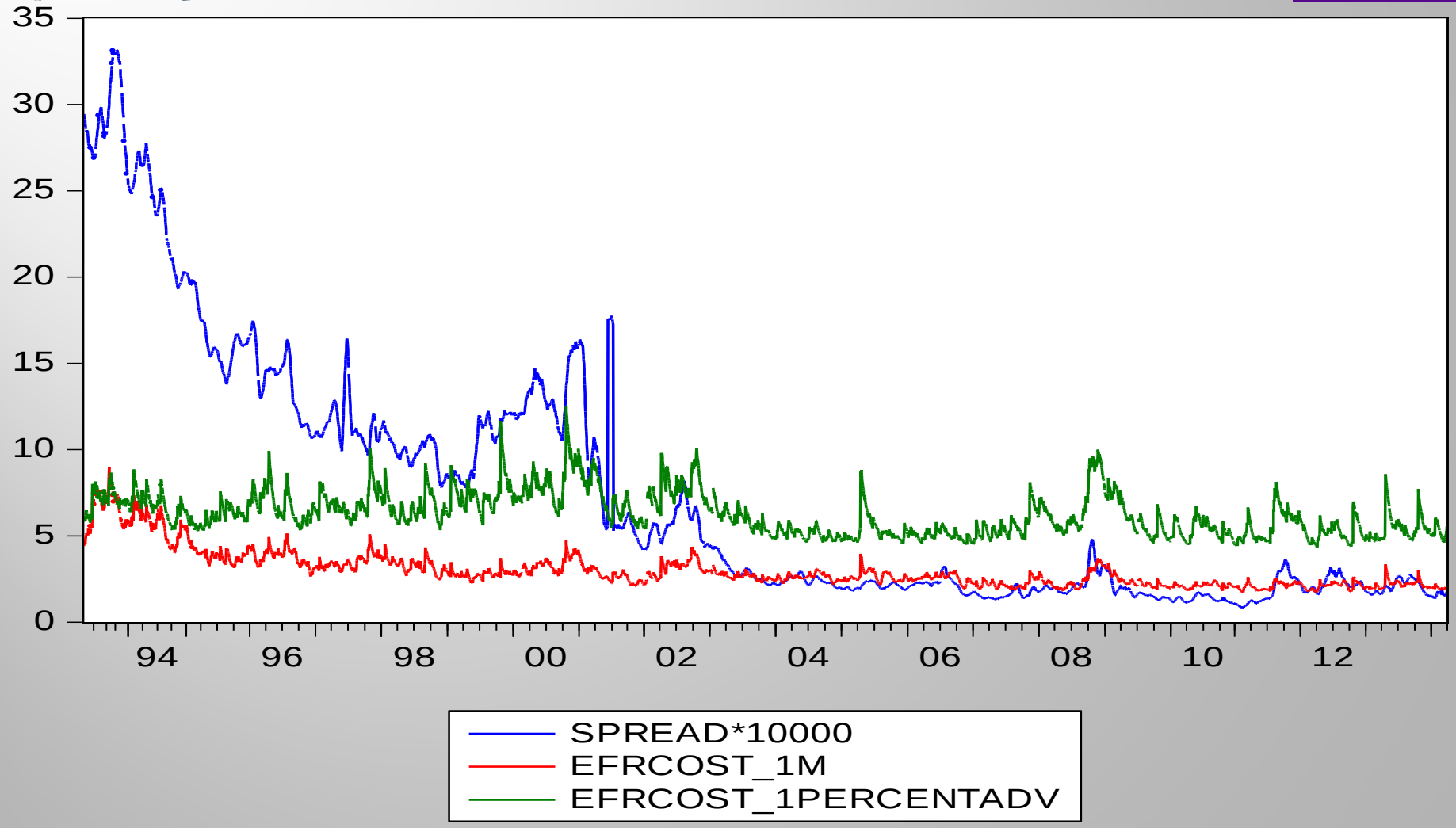
ESTIMATION

- Taking absolute values to include both buying and selling days, the model becomes

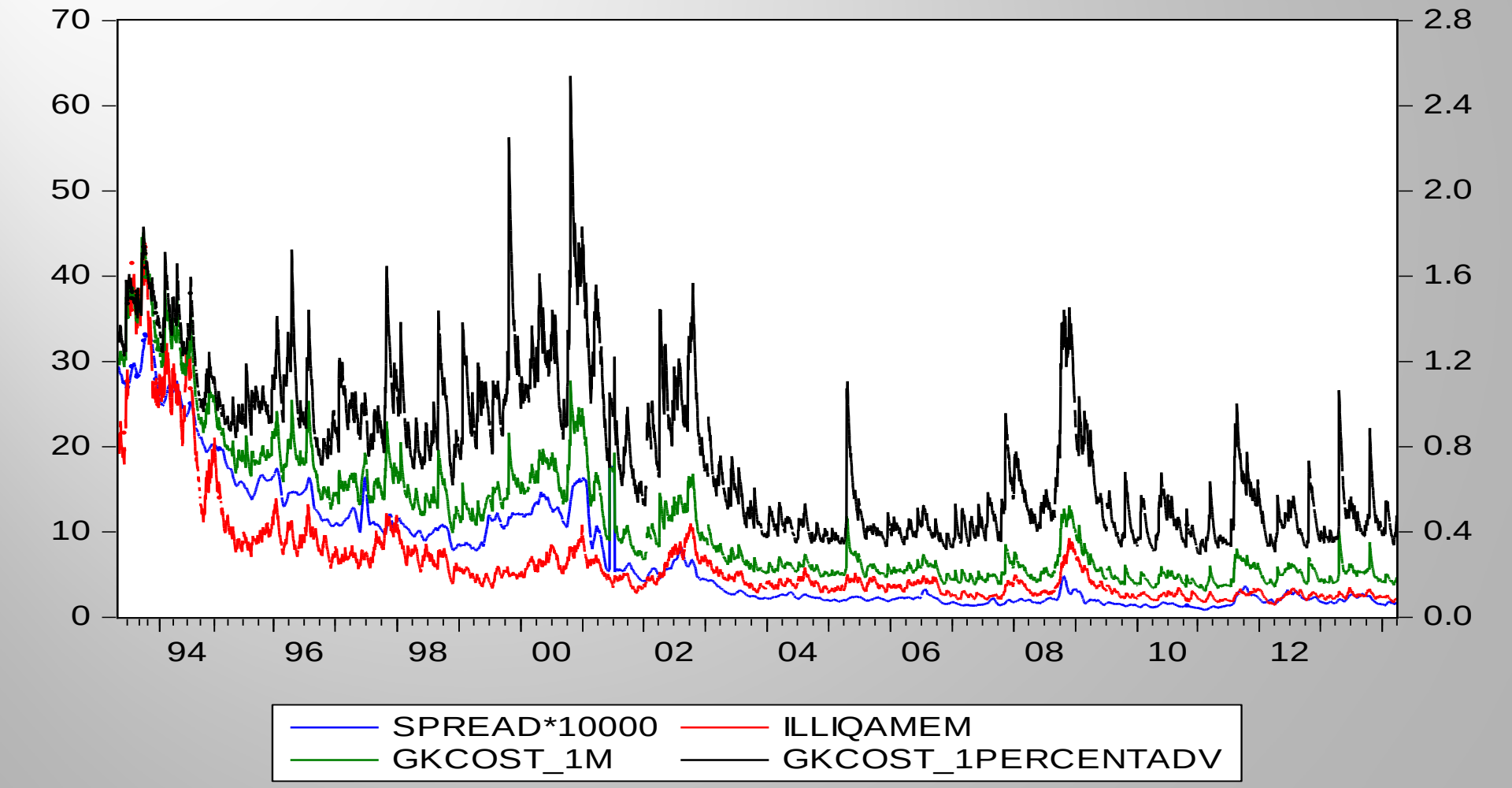
$$|\text{Return}| = \beta_1 BASpread +$$
$$+\beta_2 Volatility * \sqrt{Volume_t / AverageDailyVolume_{t-1}}$$

- The coefficients can be estimated for a time series of days or a panel of days and names.

IBM Results


35
30
25
20
15
10
5
0
94
96
98
00
02
04
06
08
10
12
SPREAD*10000
EFRCOST_1M
EFRCOST_1PERCENTADV

GK ESTIMATES



Don't ask....


THE ARCH
Cafe
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