WHAT'S NEW IN VLAB

ROB ENGLE, DIRECTOR

APRIL 29,2016

VOLATILITY INSTITUTE CONFERENCE

OVERVIEW

- New Welcome page
- INTEREST RATE MODEL
- SRISK CALCULATION
- SRISK FOR EM
- CORRELATION WITH COMMODITIES
- SOVEREIGN CDS

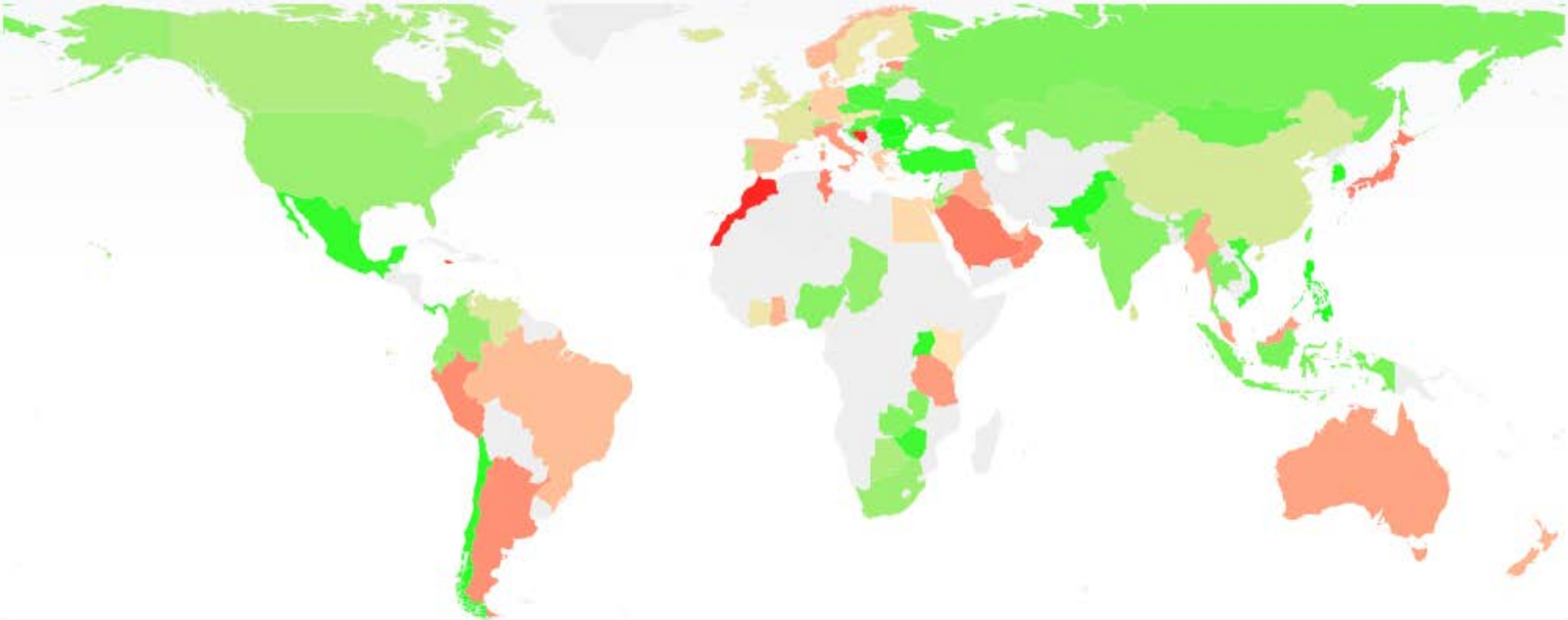
VOLATILITY OVERVIEW SEE MORE

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

Global Volatility

Region: World

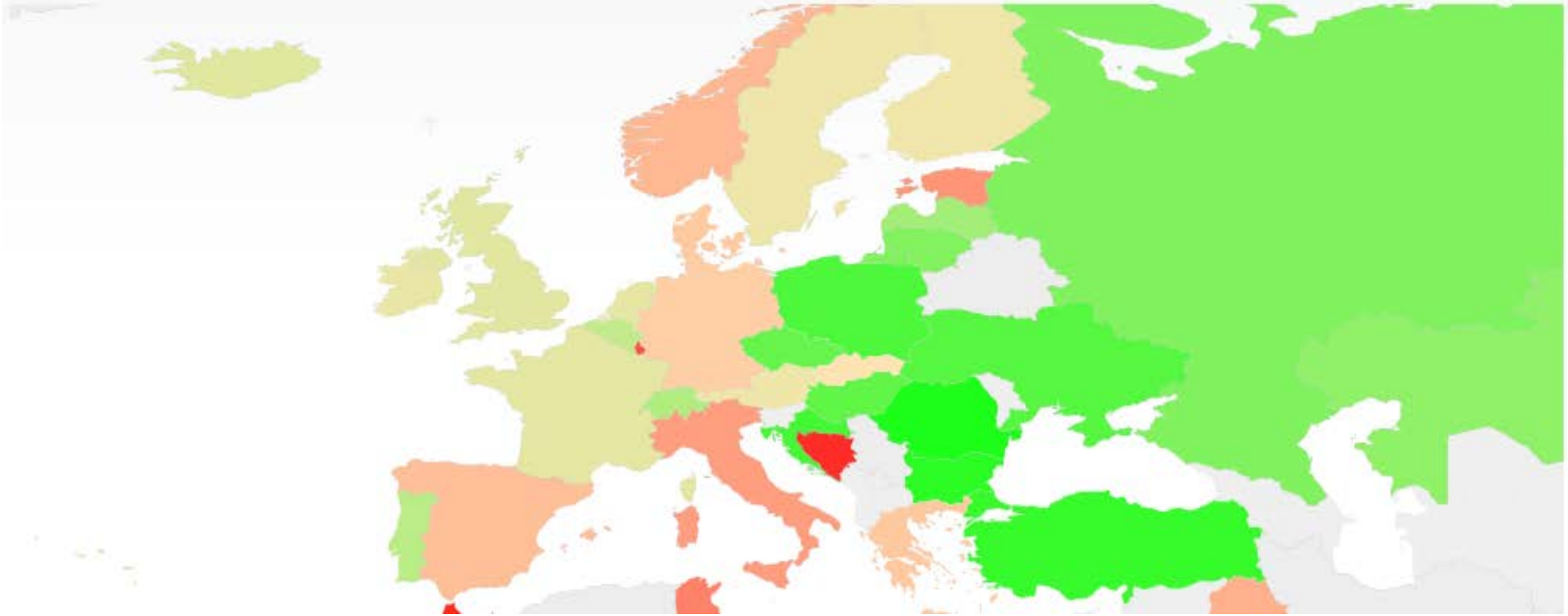
Now



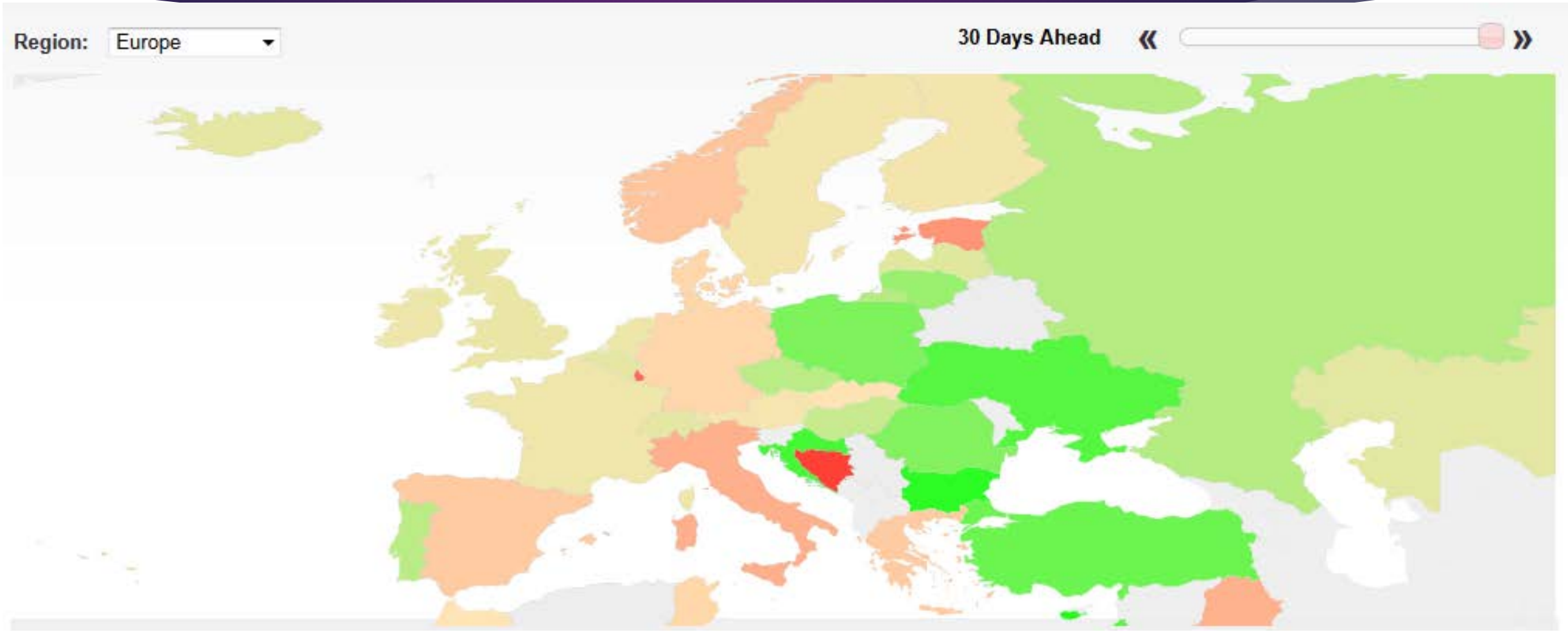
Global Volatility

Region: Europe

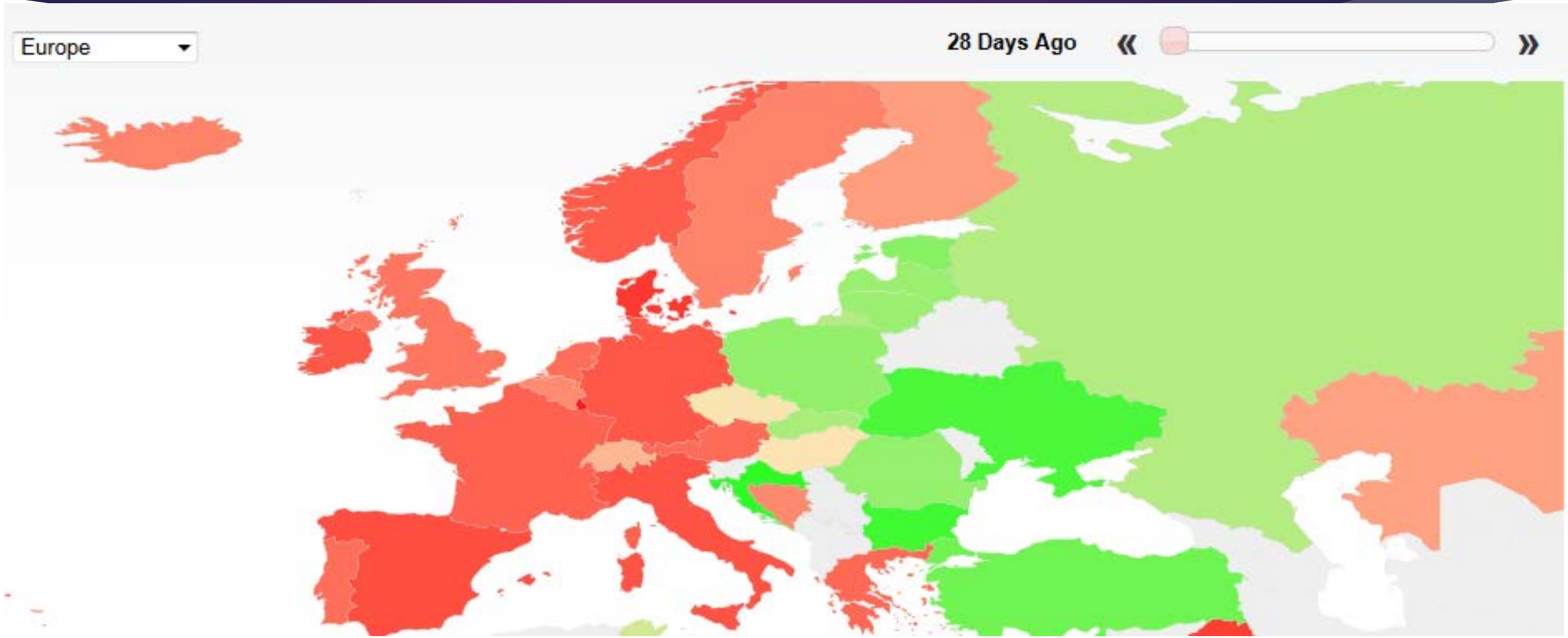
Now « »



30 DAYS FROM NOW



30 DAYS AGO



FRANCE VOLATILITY SUMMARY

France Volatility Summary

Volatility by Industry

All	28.95%
Basic Materials	32.47%
Consumer Goods	29.85%
Consumer Services	30.56%
Financials	22.95%
Health Care	37.70%
Industrials	27.19%
Oil & Gas	28.13%
Technology	29.43%
Telecommunications	27.21%
Utilities	29.80%

Market Summary

Equities

CAC 40 Index	16.20	-0.34

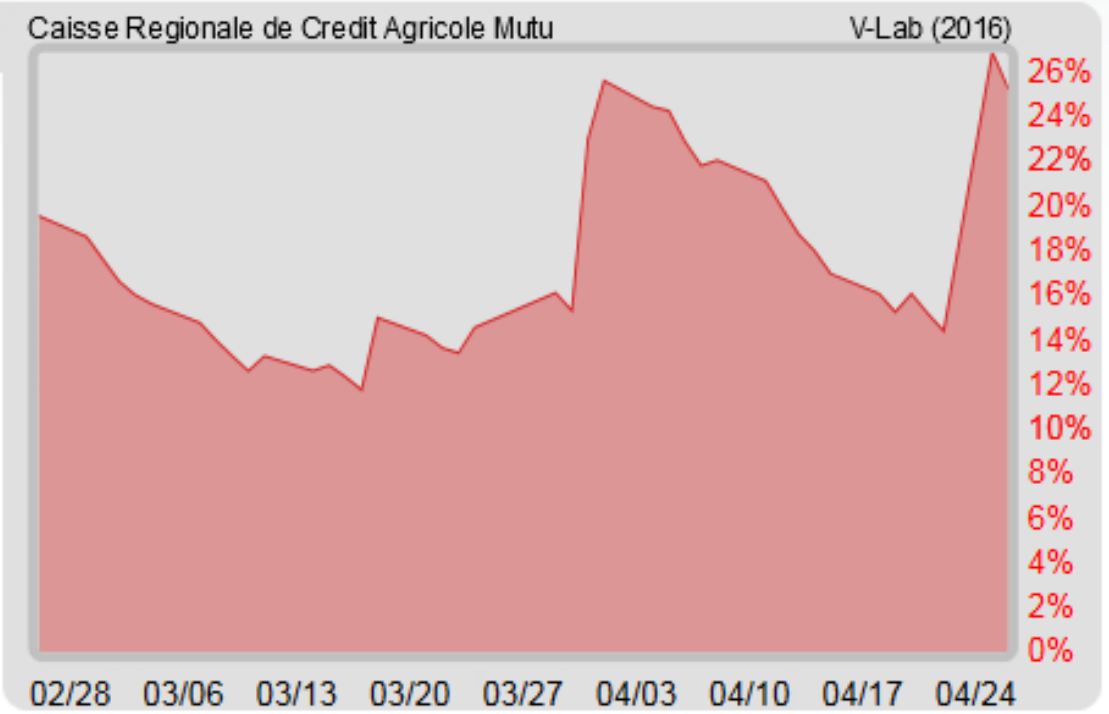
Currencies

Euro	7.86	+0.04

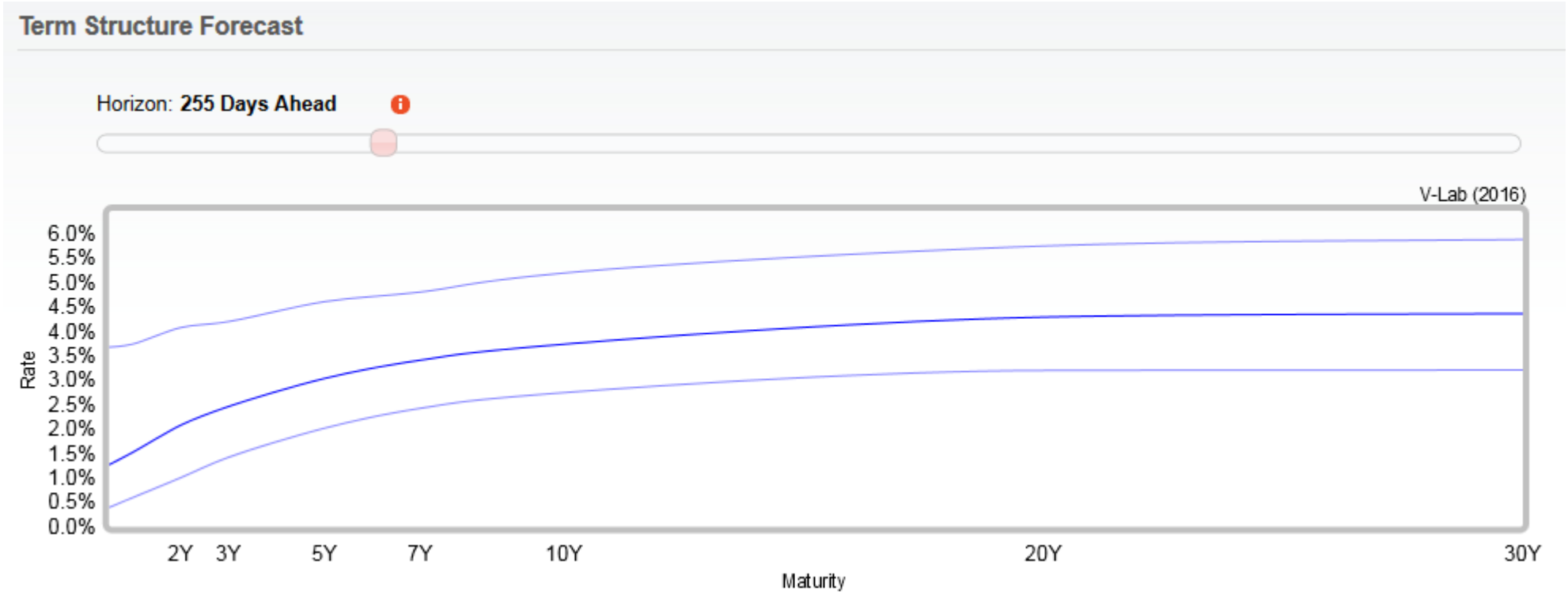
FRENCH FINANCIALS

France Financials Volatility Summary

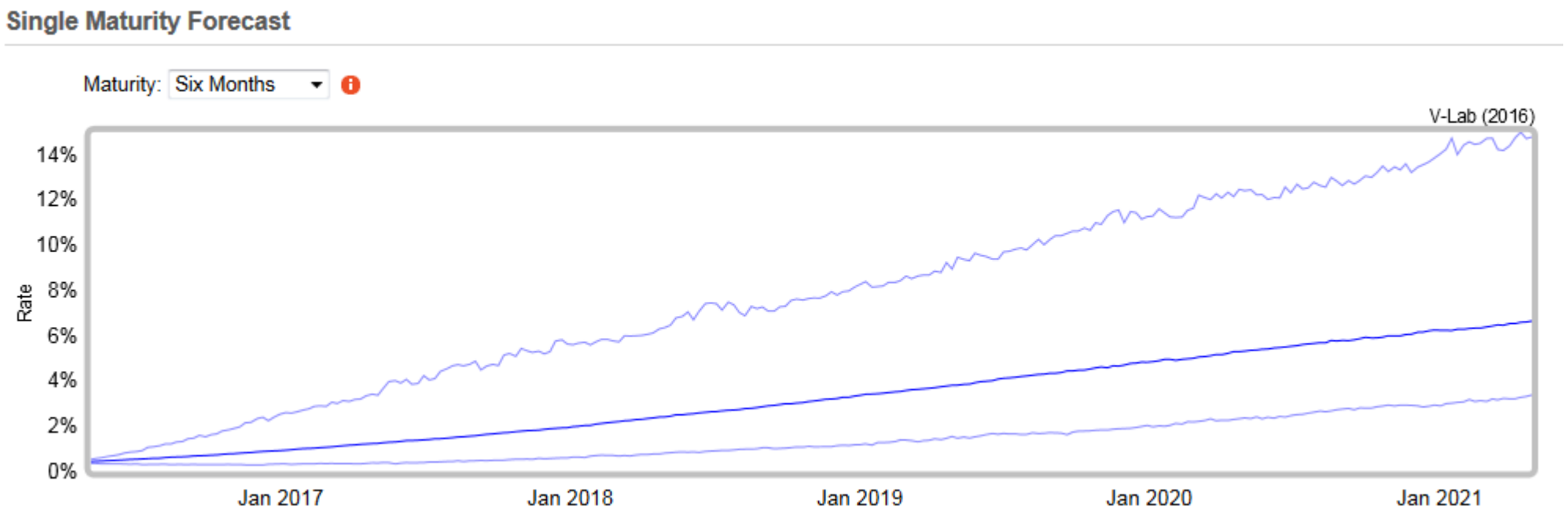
Ticker	Level	Relative Volatility
CRAP:FP	24.50%	
CBDG:FP	73.05%	
LI:FP	27.89%	
FIM:FP	33.92%	
GLE:FP	38.16%	
CNF:FP	20.12%	
ALTA:FP	29.26%	
CAF:FP	18.46%	
BNP:FP	33.34%	
CGR:FP	21.51%	



Confidence Bands for Interest Rates



Confidence bands for six month rates



Confidence bands for rates from last year.

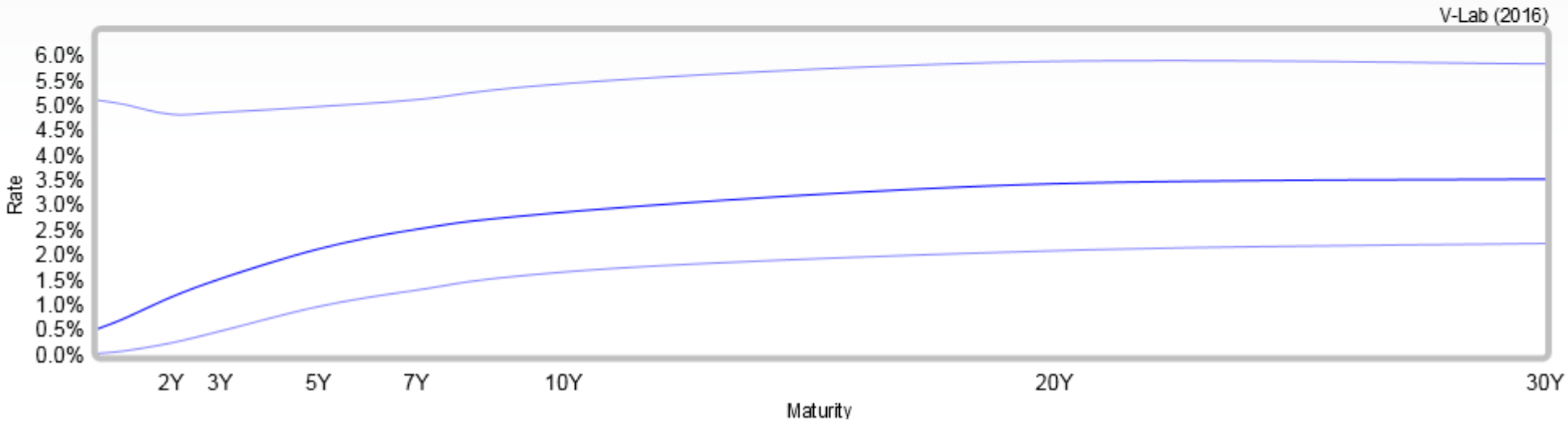
FIXED INCOME ANALYSIS (GARCH-DCC REDUCED RANK VAR) OF US TREASURIES

Curve: Yields

Date: April 2015

Term Structure Forecast

Horizon: **255 Days Ahead**



NEW SRISK CALCULATION

- How much capital would a firm need to raise in order to continue to function if we have another financial crisis like the last?
- Let $R^{\text{Global}}_{t/t+126} = \dfrac{P_{t+126} - P_t}{P_t}$ be the fractional return on the global equity market over the next six months.

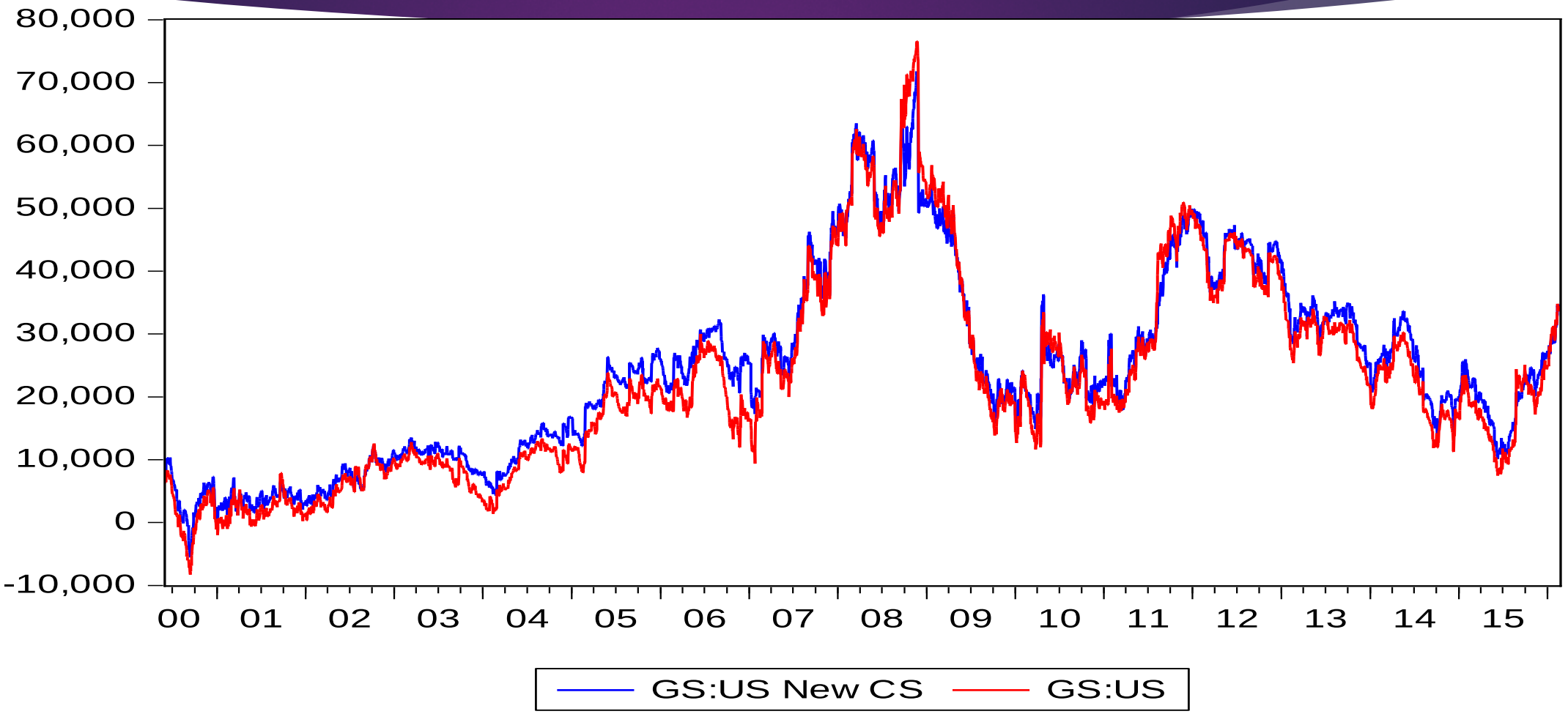
$$OLD\ SRISK = E_t\left(Capital\ Shortfall \middle| R^{\text{Global}}_{t/t+126} \le -.40\right)$$

$$NEW\ SRISK = Median\left(Capital\ Shortfall \middle| R^{\text{Global}}_{t/t+126} = \kappa\right)$$

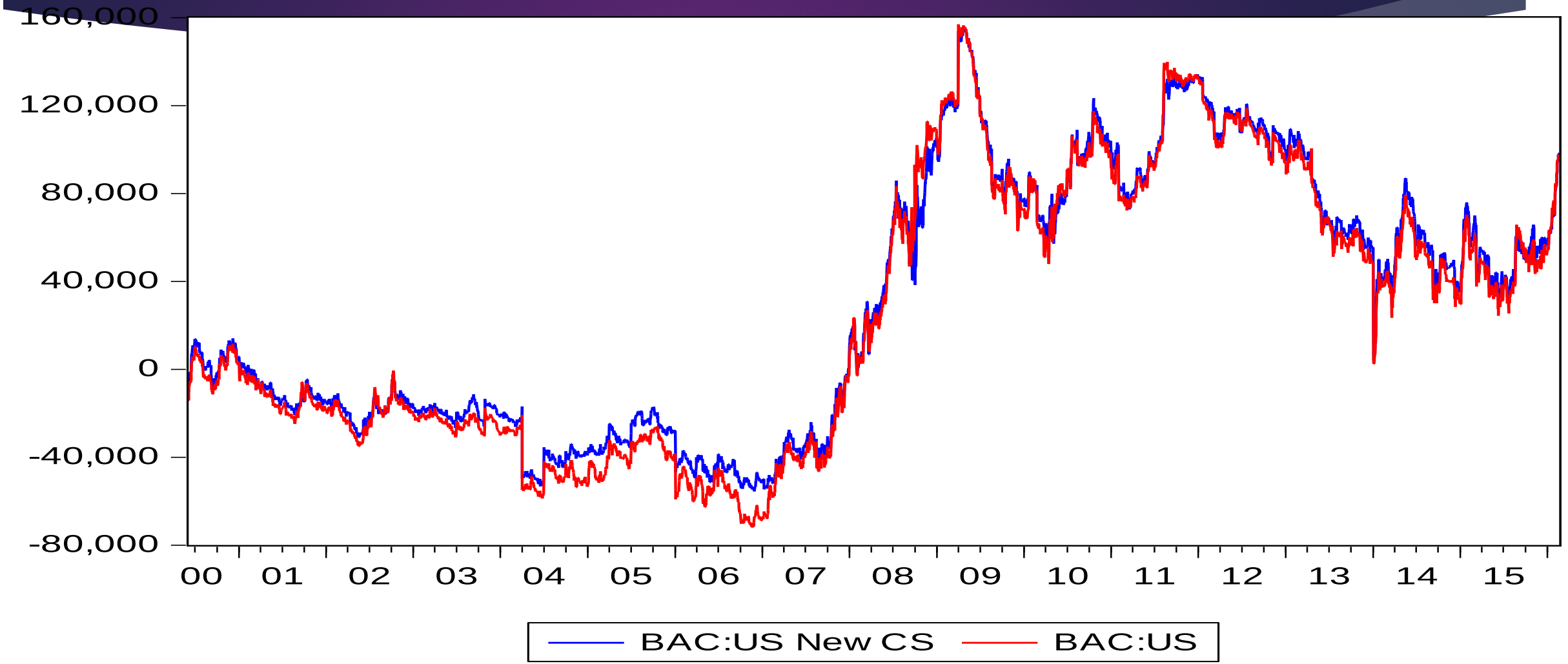
- OLD SRISK was approximated or was simulated in MESSIM. Even here outliers in the simulation needed to be trimmed.
- If
  - i) volatilities and correlations remain constant
  - ii) the median idiosyncratic shock is zero
- Then

$$NEW\ \ SRISK = k * BOOK\ LIABILITIES - (1-k) * MC * \exp\left(\log(1+\kappa) * beta\right)$$

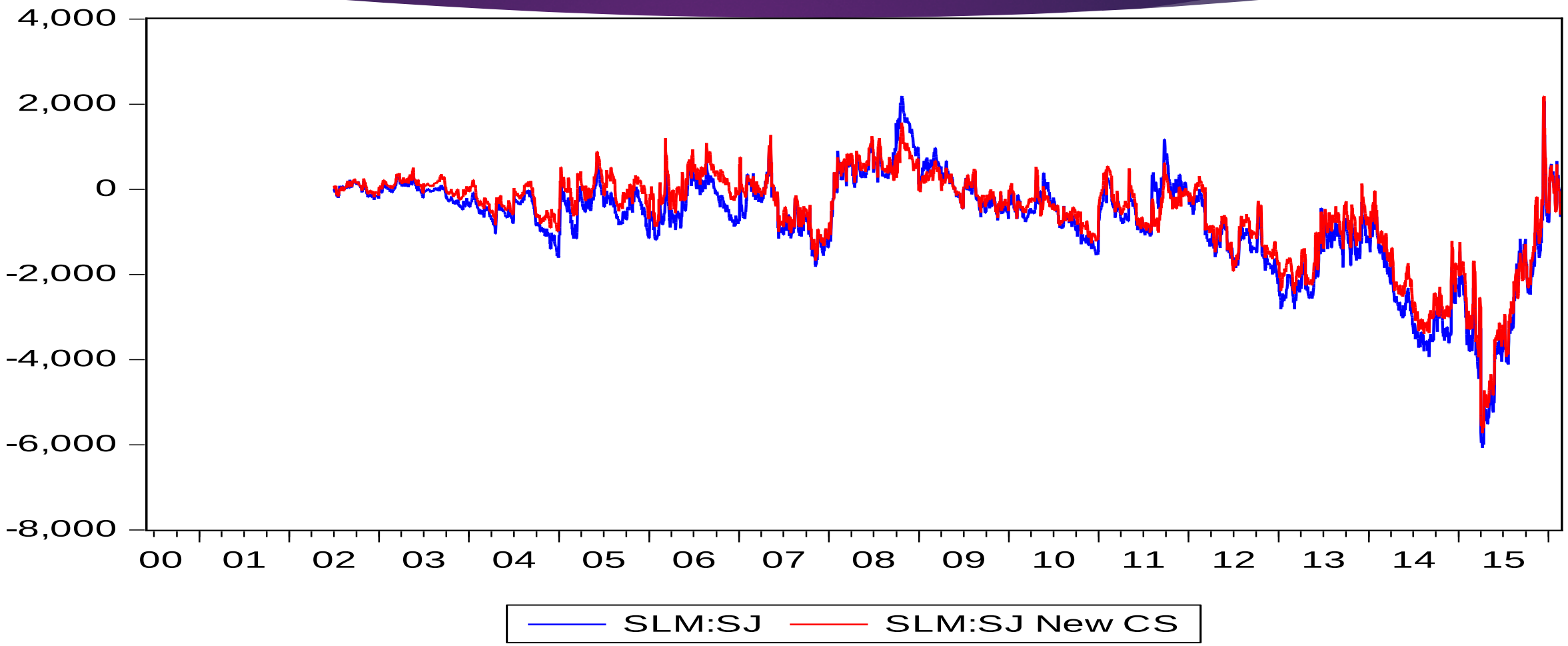
OLD AND NEW SRISK – GOLDMAN SACHS



OLD AND NEW BANK OF AMERICA



SLM OLD AND NEW SRISK



ADJUSTMENTS

Plot Options

- (•) SRISK
- ( ) LRMES
- ( ) Beta
- ( ) Correlation
- ( ) Volatility
- ( ) Leverage

Crisis Definition

Market declines: 40 % in six months

Display Options

Firms to display: 100 of 231

	Region	Capital Req
( )	Africa	8.0 %
(•)	Americas	8.0 %
( )	Asia	8.0 %
( )	Europe	5.5 %

STRESS

-40%

Institution	SRISK%	RNK▲	SRISK ($ m
Bank of America Corp	12.29	1	82,968
Citigroup Inc	10.75	2	72,558
JPMorgan Chase & Co	9.88	3	66,671
MetLife Inc	6.18	4	41,755
Prudential Financial Inc	6.15	5	41,530

-50%

Institution	SRISK%	RNK▲	SRISK ($ m
Bank of America Corp	11.22	1	98,725
JPMorgan Chase & Co	10.28	2	90,481
Citigroup Inc	9.86	3	86,772
MetLife Inc	5.34	4	46,976
Prudential Financial Inc	5.13	5	45,144

-30%

Institution	SRISK%	RNK▲	SRISK ($ m
Bank of America Corp	13.22	1	66,177
Citigroup Inc	11.30	2	56,569
JPMorgan Chase & Co	8.25	3	41,309
Prudential Financial Inc	7.52	4	37,645
MetLife Inc	7.22	5	36,161

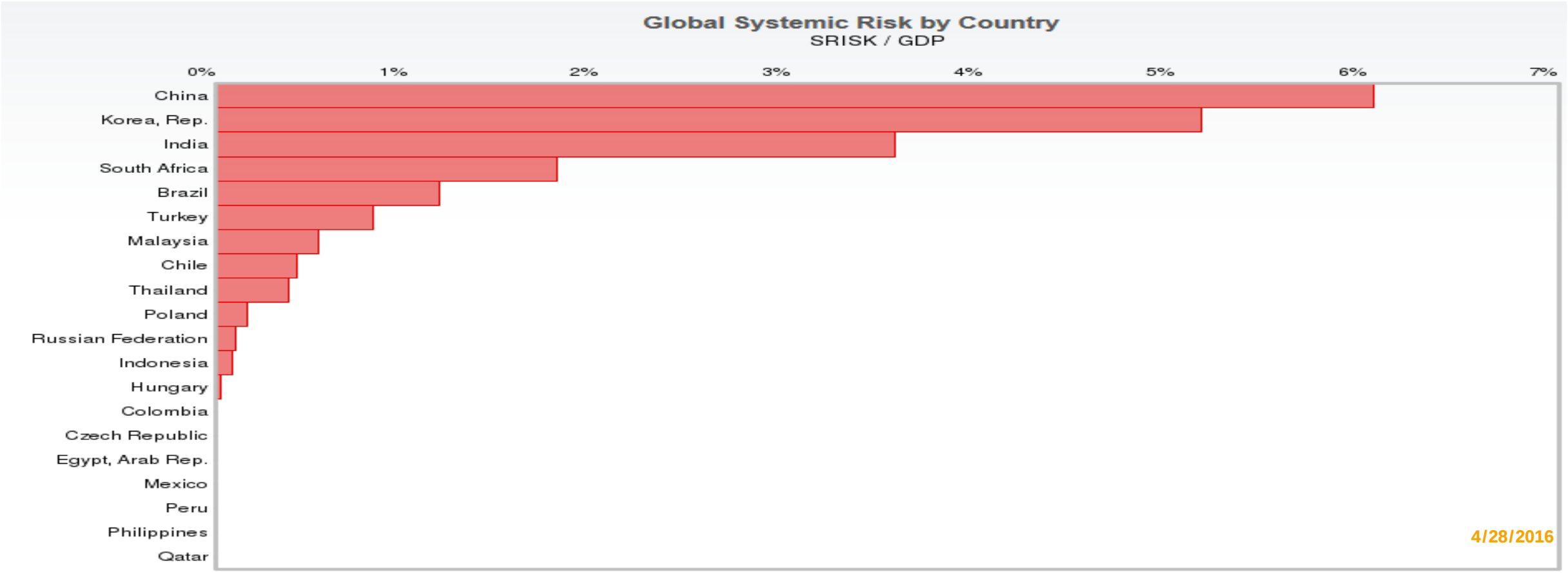
SRISK IN EMERGING MARKETS

- Traditionally, the banking sector in emerging markets is not systemically important. Often it is not only well capitalized but it is overcapitalized and non-competitive.
- However, with the collapse of commodity prices, many loan books are showing stress.
- We will examine the new data on SRISK in Emerging Markets.

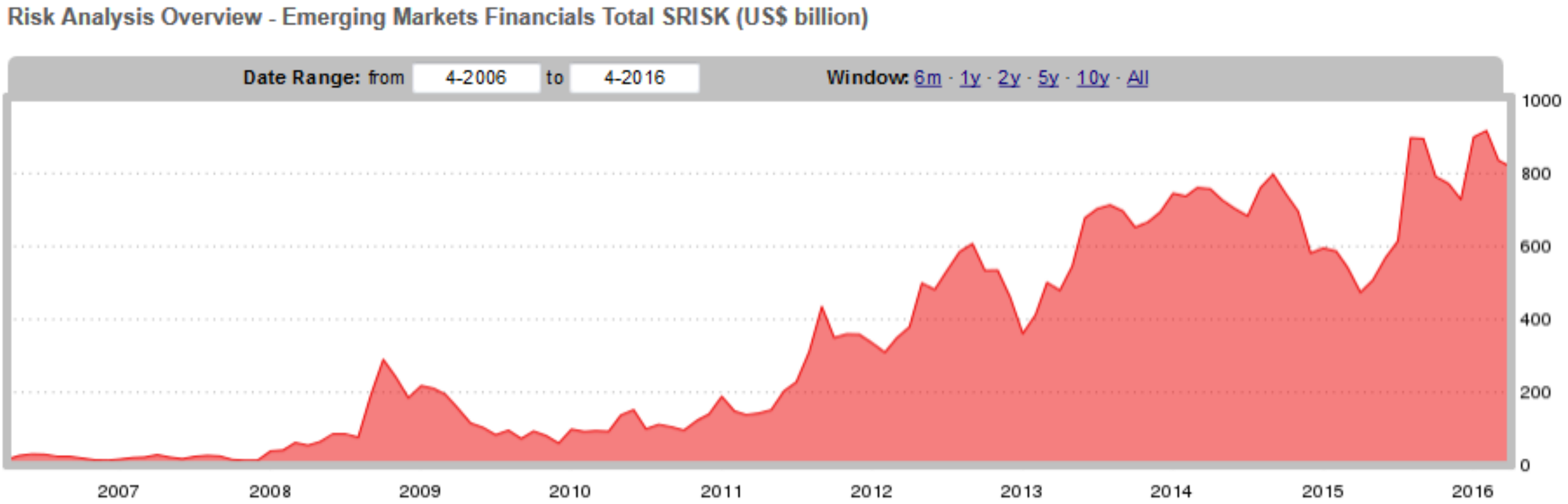
NEW AGGREGATES

- We have 72 countries. These can now be viewed not only by region but also by
  - Developed; 24 countries
  - Developing; 32 countries
  - Emerging; 22 countries
  - EAFE; 21 countries
  - Frontier; 15 countries
  - Custom

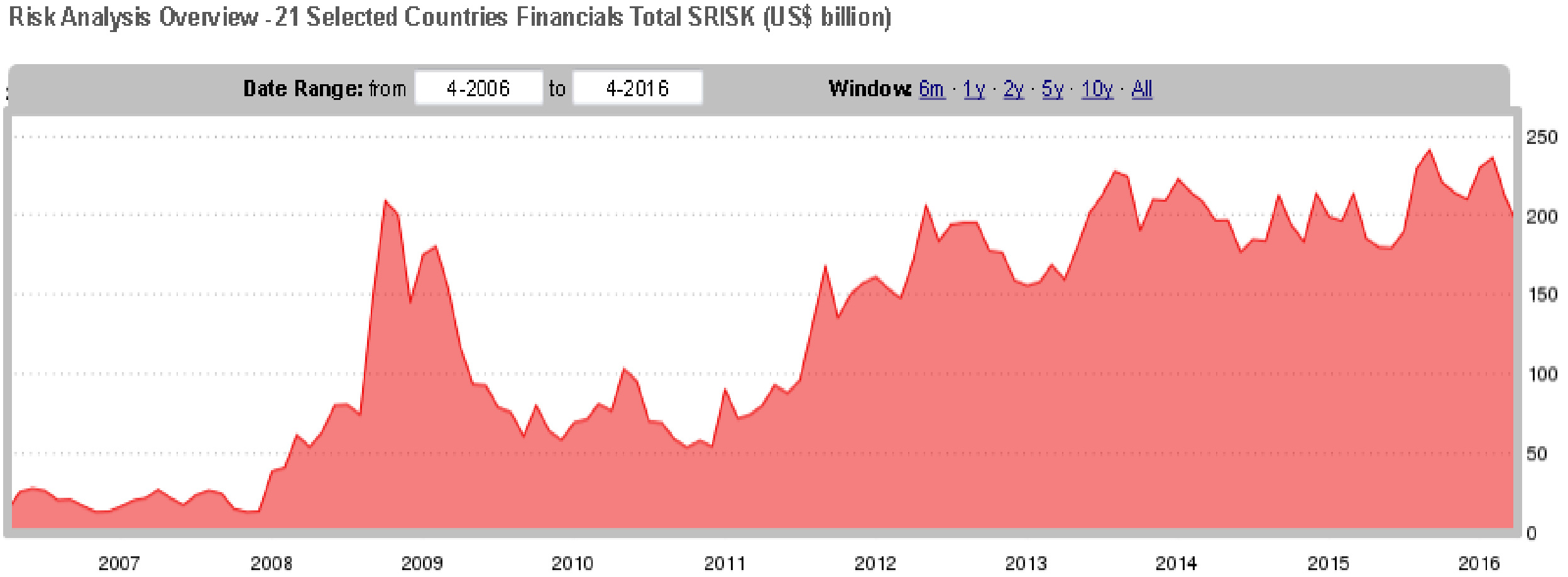
EMERGING MARKET SRISK/GDP



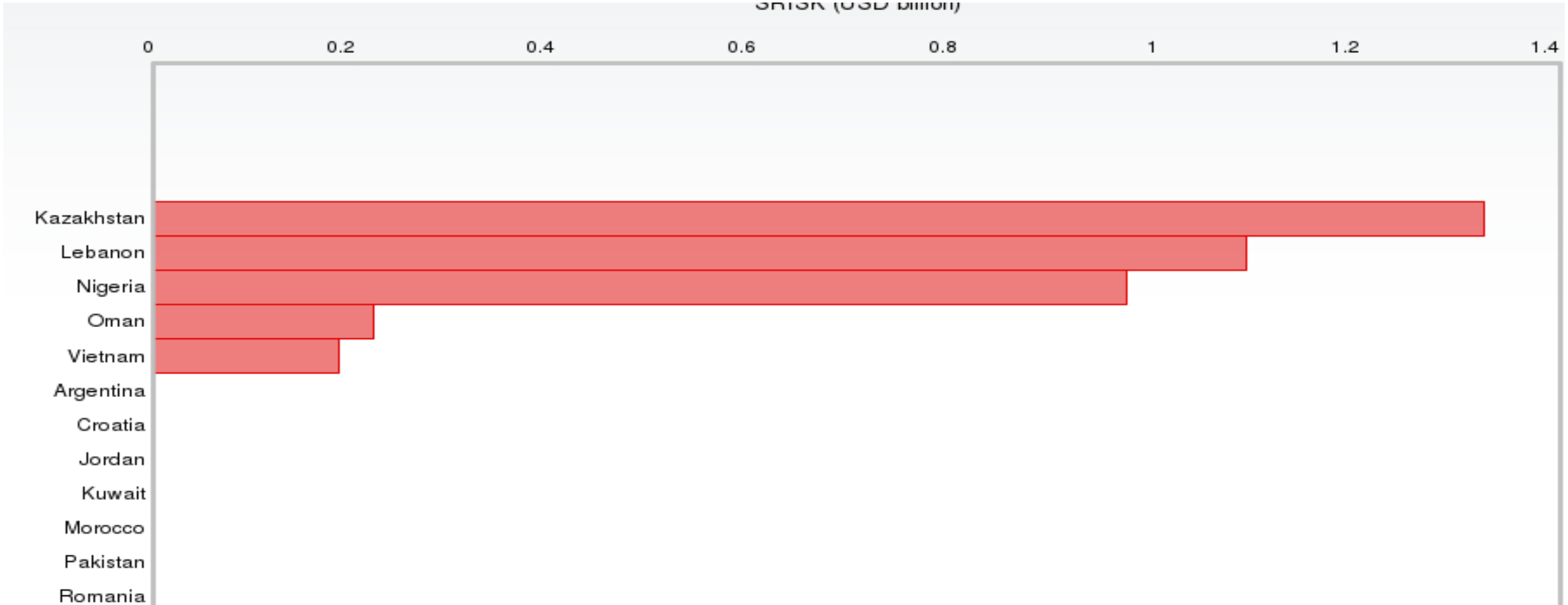
EMERGING MARKET SRISK



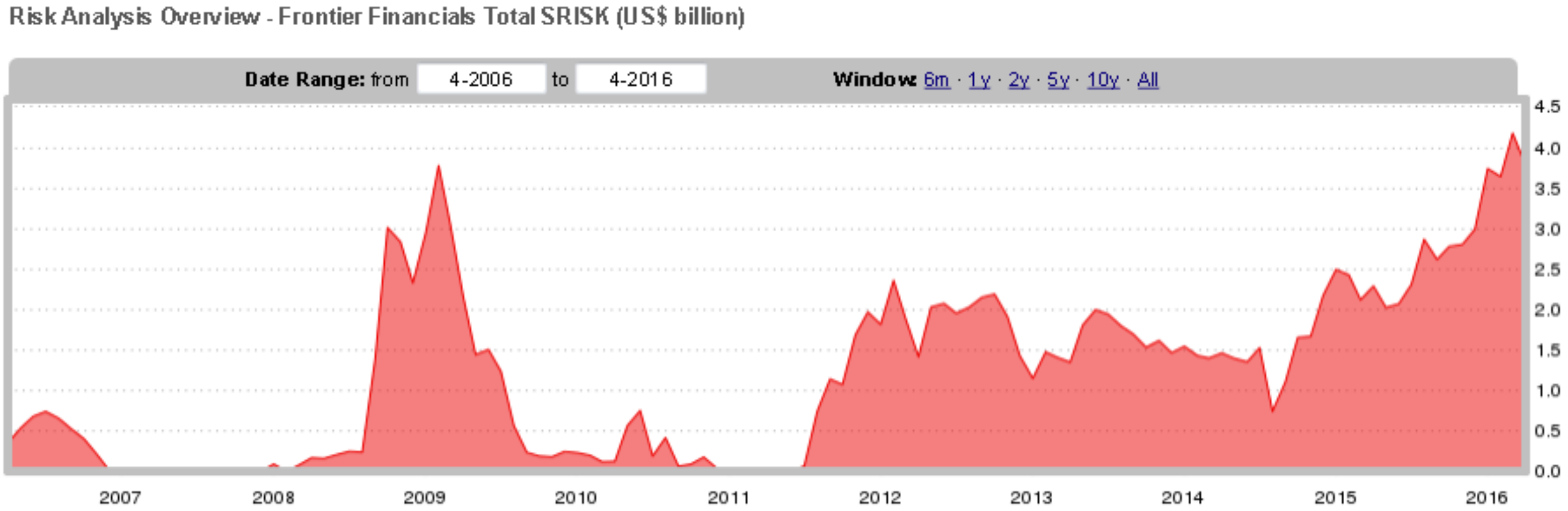
EMERGING ex CHINA



FRONTIER


0
0.2
0.4
0.6
0.8
1
1.2
1.4
Kazakhstan
Lebanon
Nigeria
Oman
Vietnam
Argentina
Croatia
Jordan
Kuwait
Morocco
Pakistan
Romania

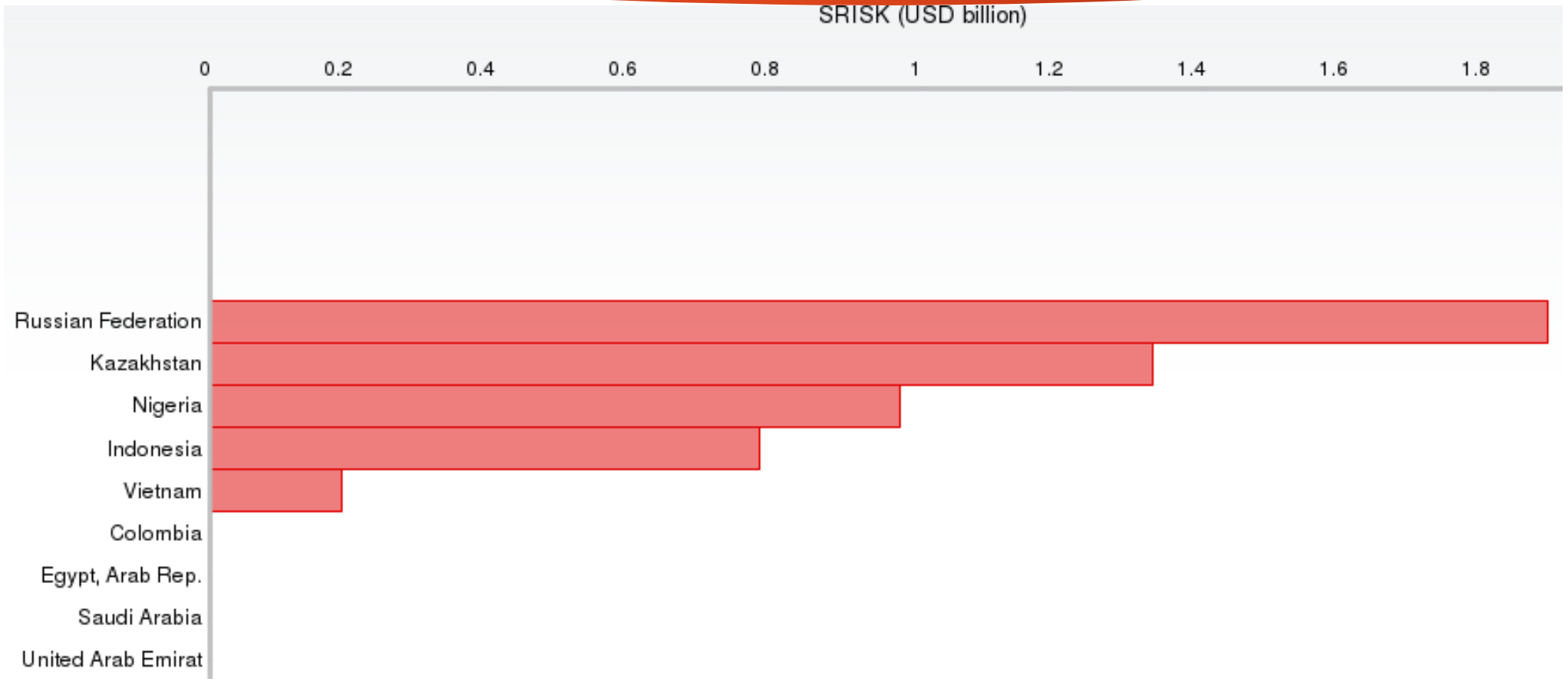
FRONTIER


Risk Analysis Overview - Frontier Financials Total SRISK (US$ billion)
Date Range: from 4-2006 to 4-2016
Window 6m · 1y · 2y · 5y · 10y · All
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

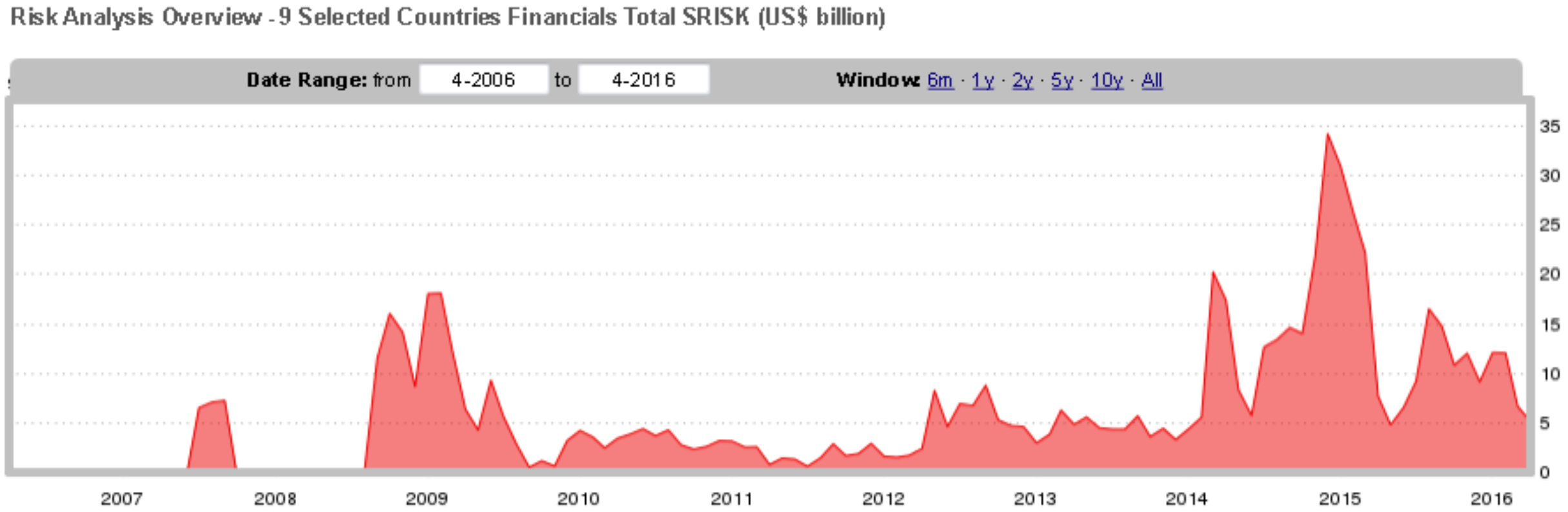
FUEL EXPORTING

- FUEL EXPORTING:
  - Kazakhstan
  - Russian Federation
  - Colombia
  - Egypt
  - Nigeria
  - Indonesia
  - Viet Nam
  - Saudi Arabia
  - United Arab Emirates

FUEL EXPORTING

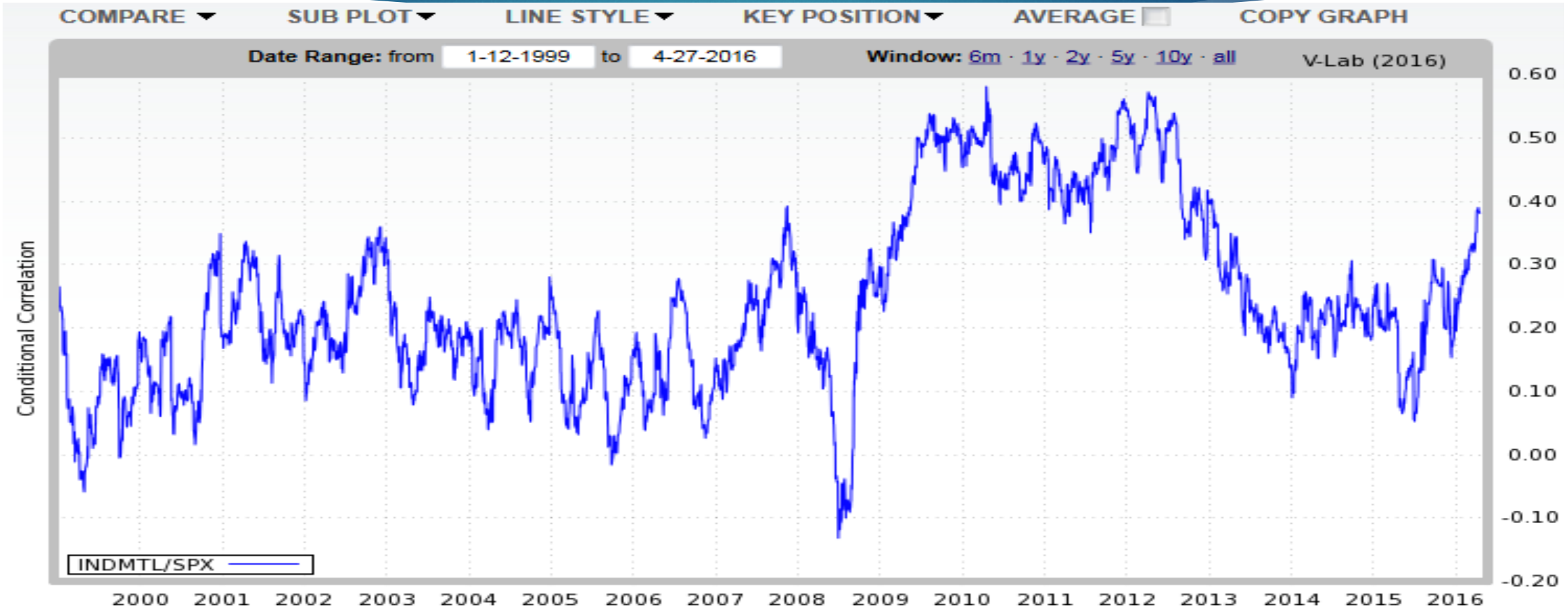


FUEL EXPORTING

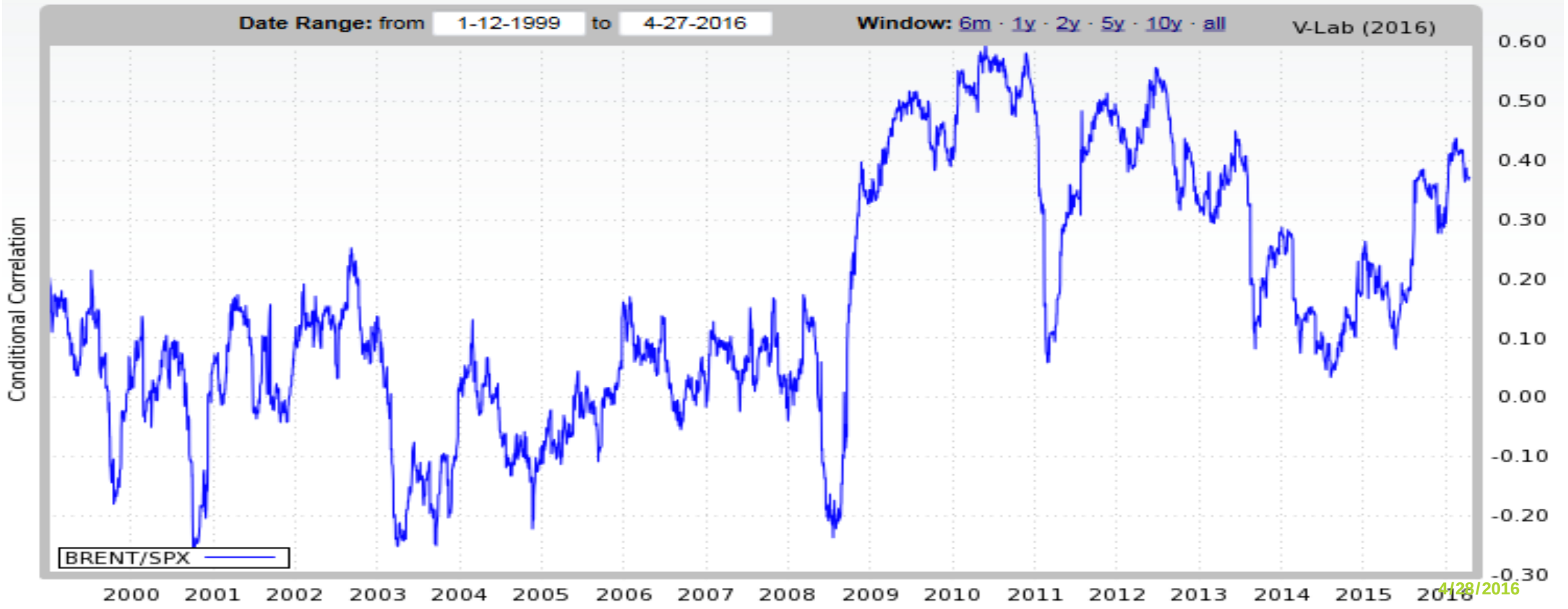


CORRELATION BETWEEN SP AND INDUSTRIAL METALS INDEX

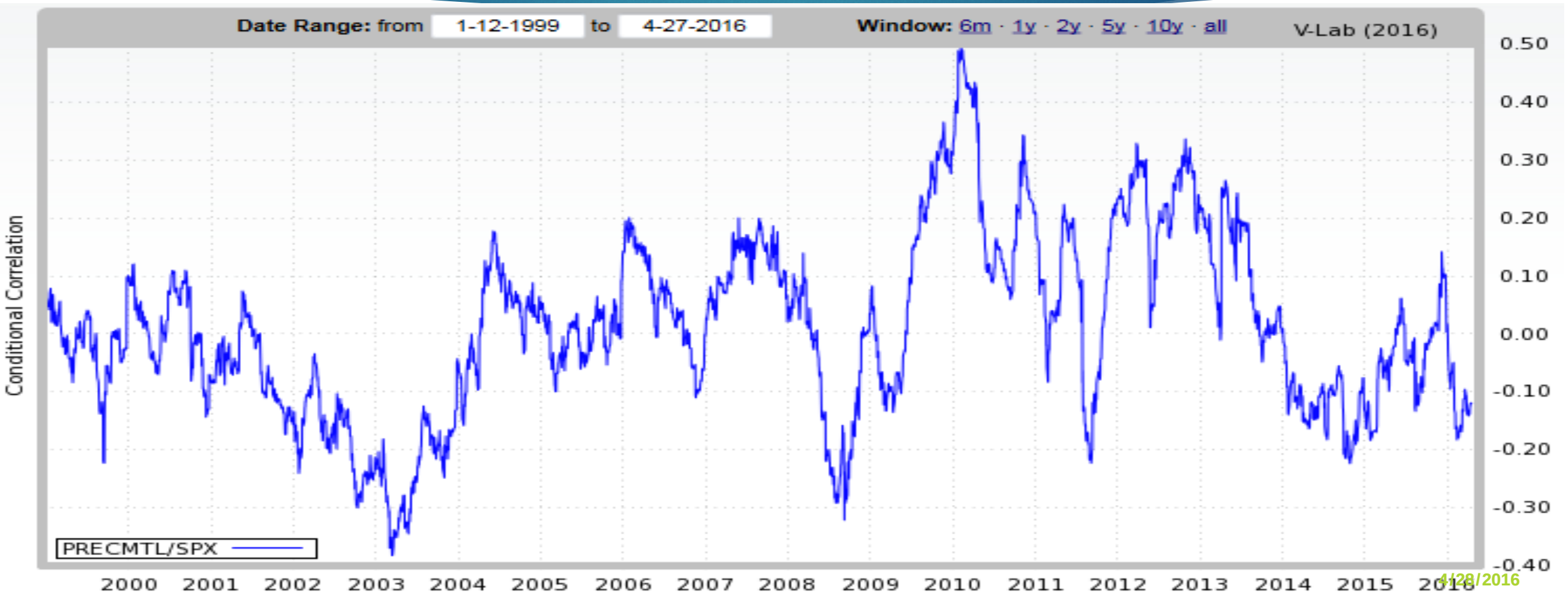
CORRELATION BETWEEN SP AND INDUSTRIAL METALS INDEX



CORRELATION BETWEEN SP AND BRENT CRUDE

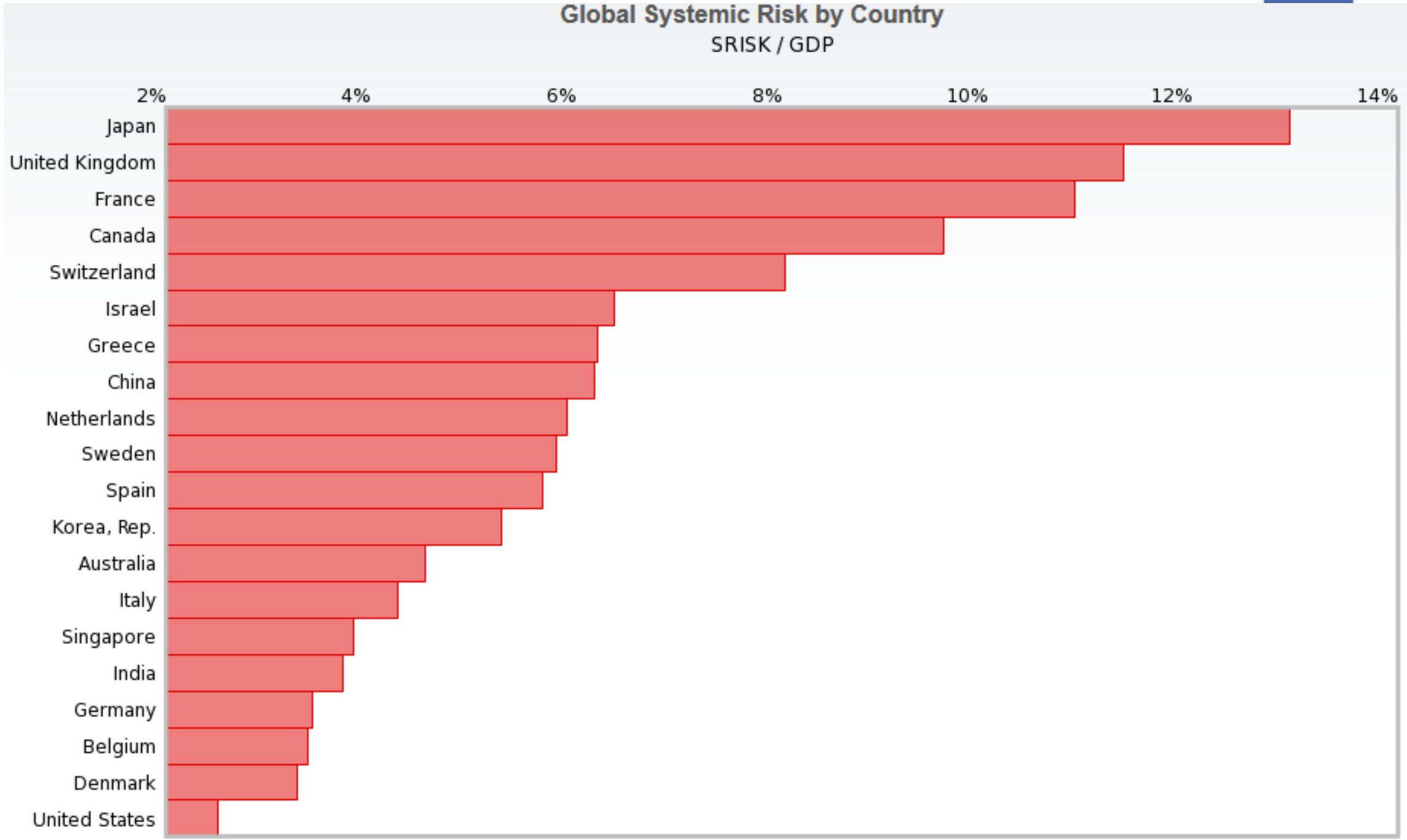


CORRELATION BETWEEN SP AND PRECIOUS METALS

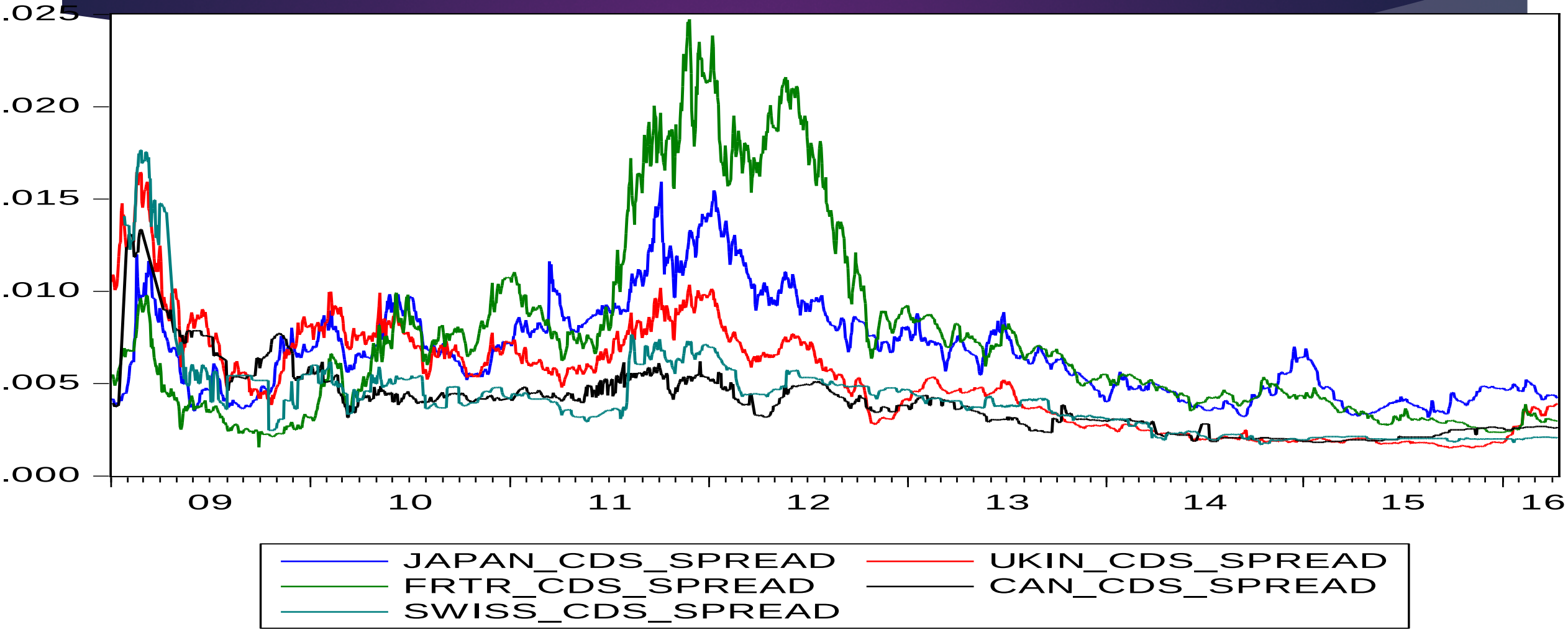


VLAB NOW HAS 54 SOVEREIGN CDS TIME SERIES AND VOLATILITY MODELS

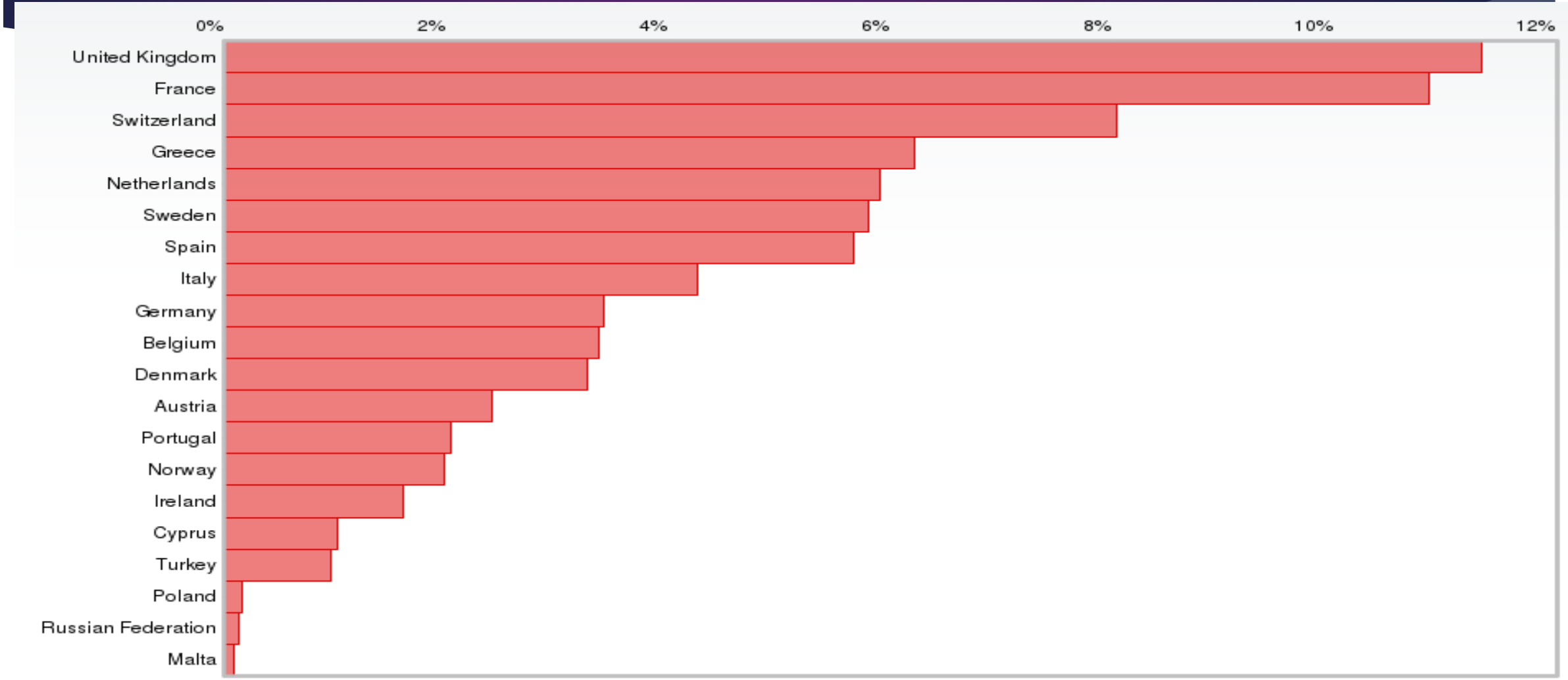
- Thank you Markit
- What do we see?
- How do these risks vary with financial stability risks?
  - Acharya, Drechsler, Schnabl, “A Pyrrhic Victory?”
- What other factors influence the sovereign spreads?


Global Systemic Risk by Country
SRISK / GDP
2%
4%
6%
8%
10%
12%
14%
Japan
United Kingdom
France
Canada
Switzerland
Israel
Greece
China
Netherlands
Sweden
Spain
Korea, Rep.
Australia
Italy
Singapore
India
Germany
Belgium
Denmark
United States

TOP 5 BY SRISK/GDP SINCE 2009

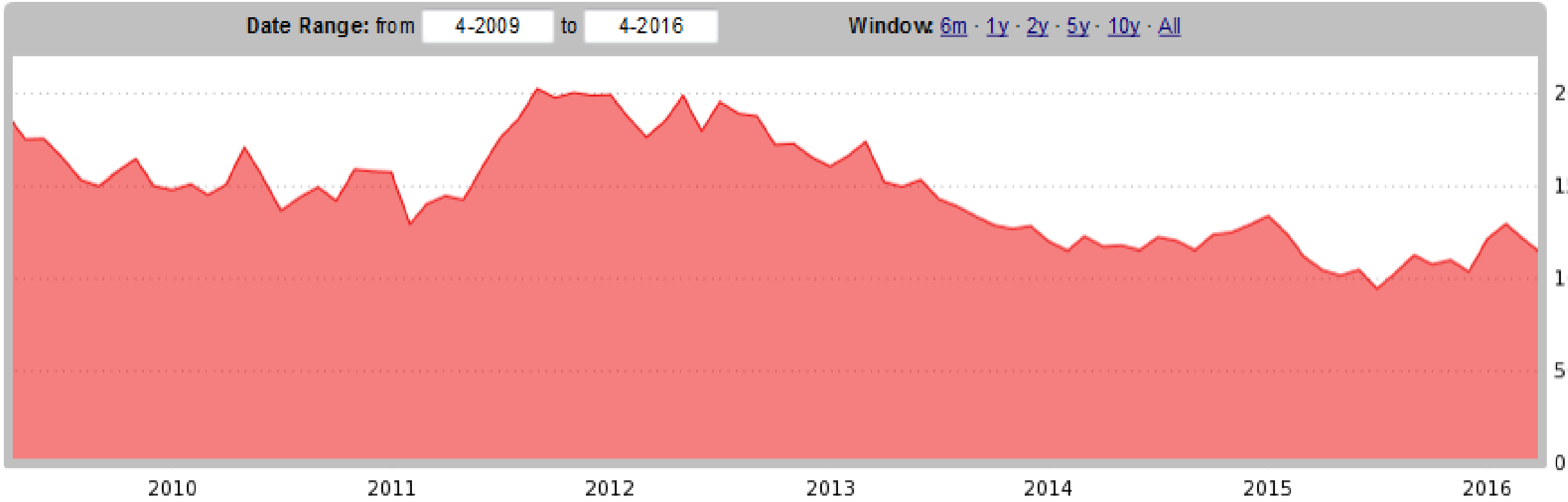


EUROPE SRISK/GDP

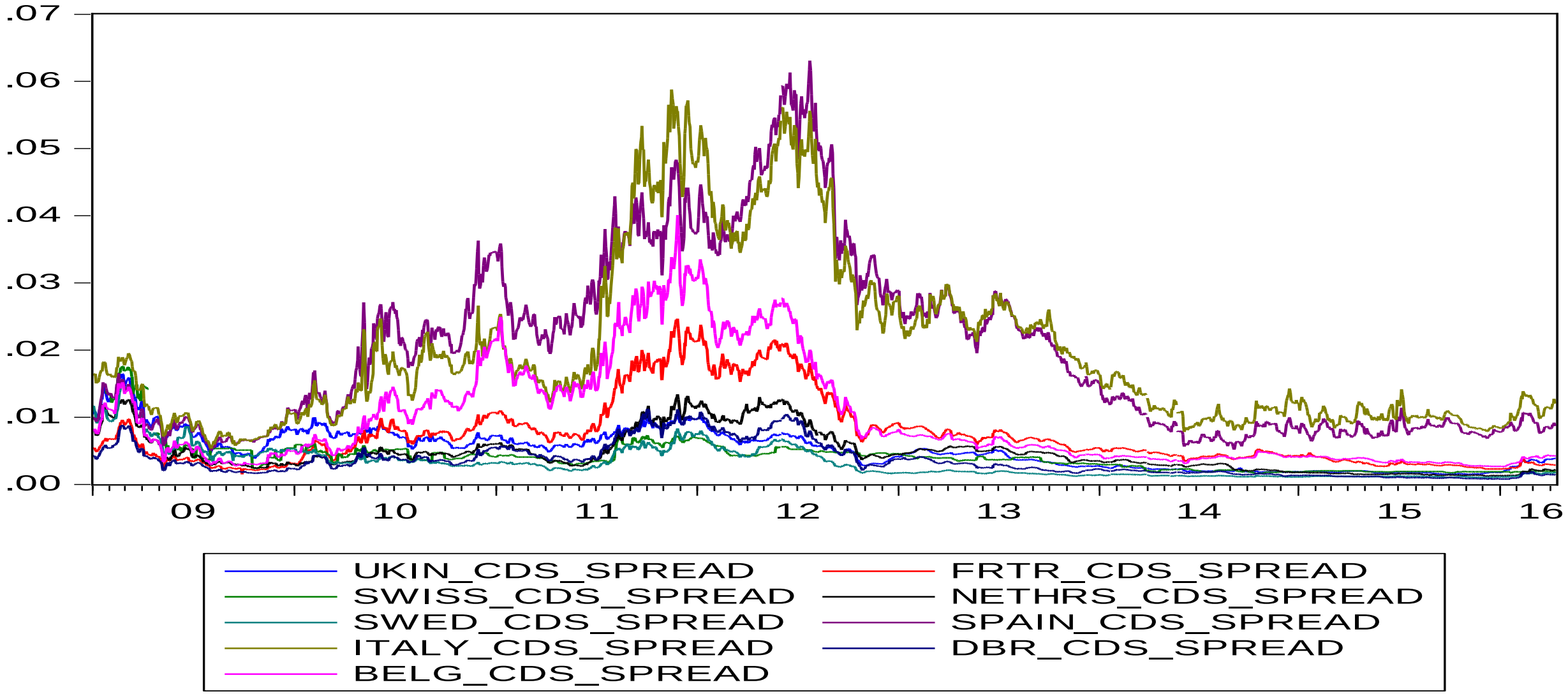


EUROPE TOTAL SRISK

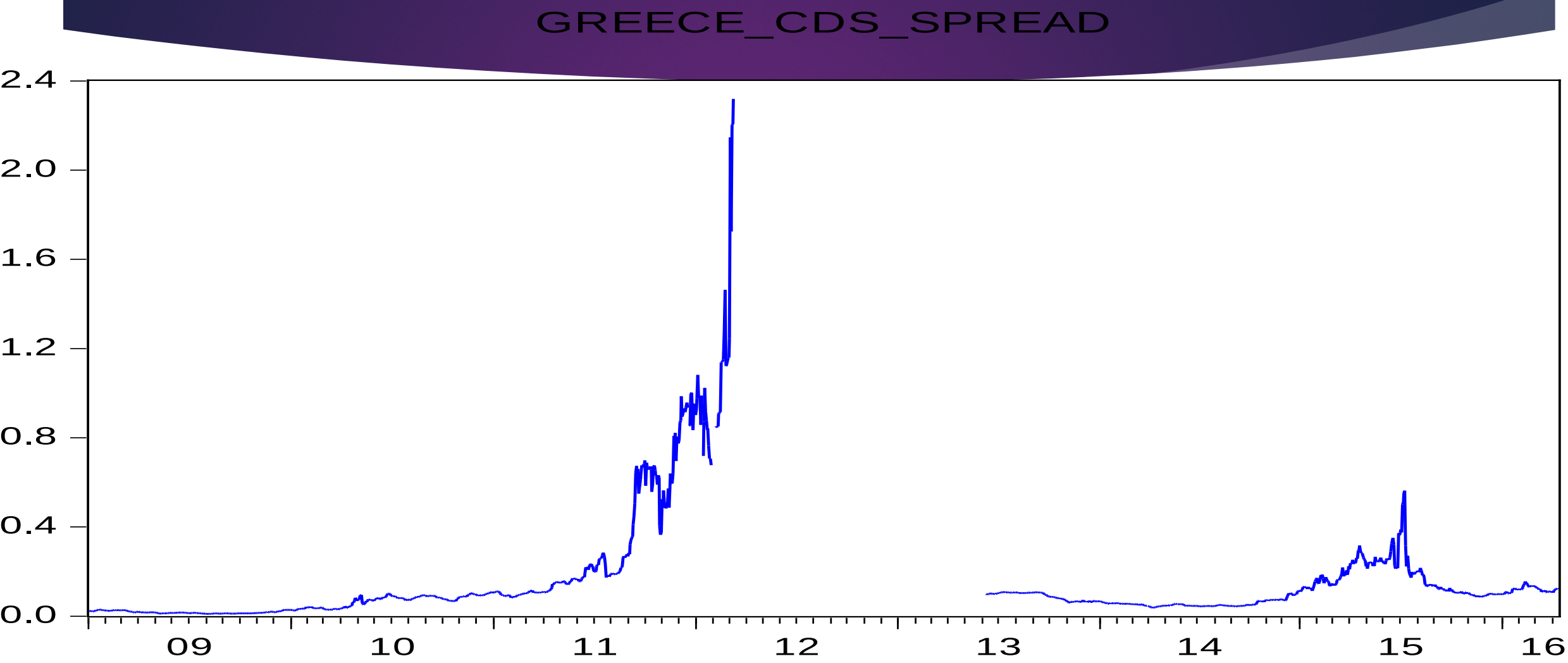
Risk Analysis Overview - Europe Financials Total SRISK (US$ billion)



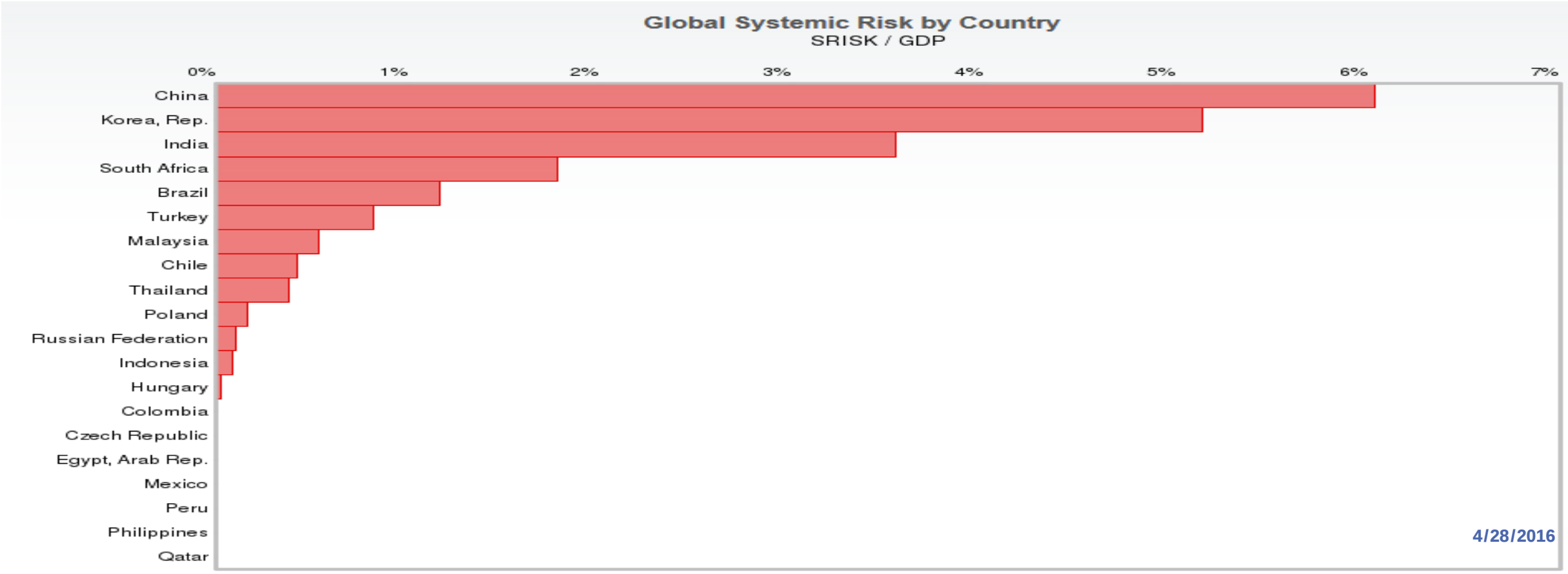
EUROPEAN SOVEREIGN TOP 10 SRISK/GDP



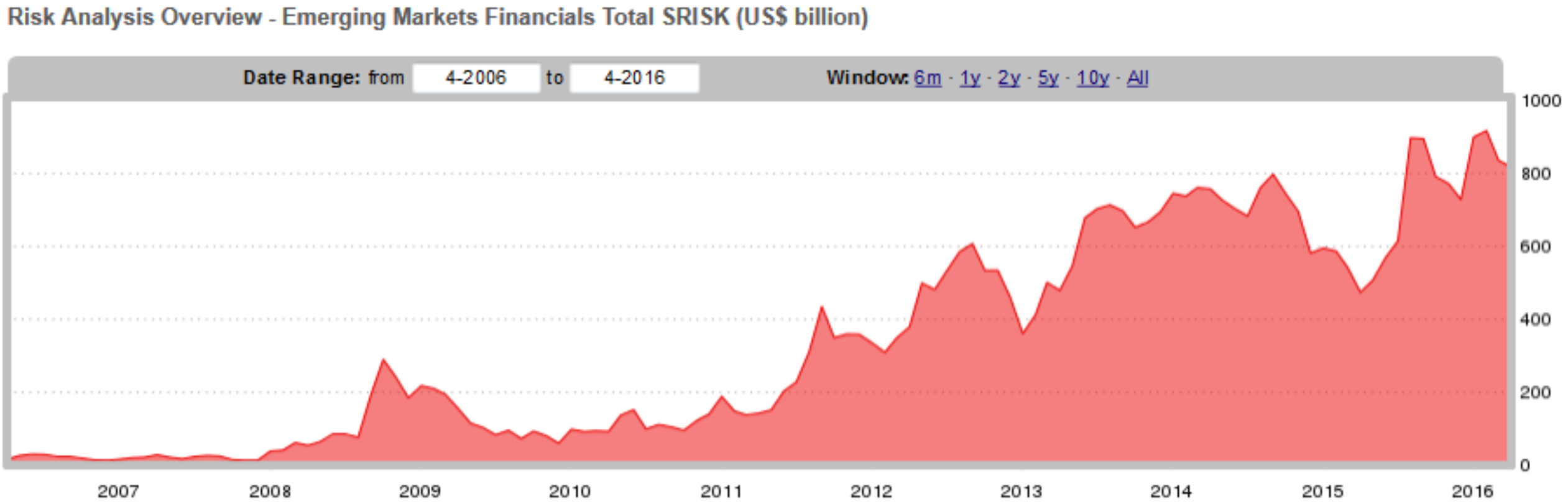
GREECE



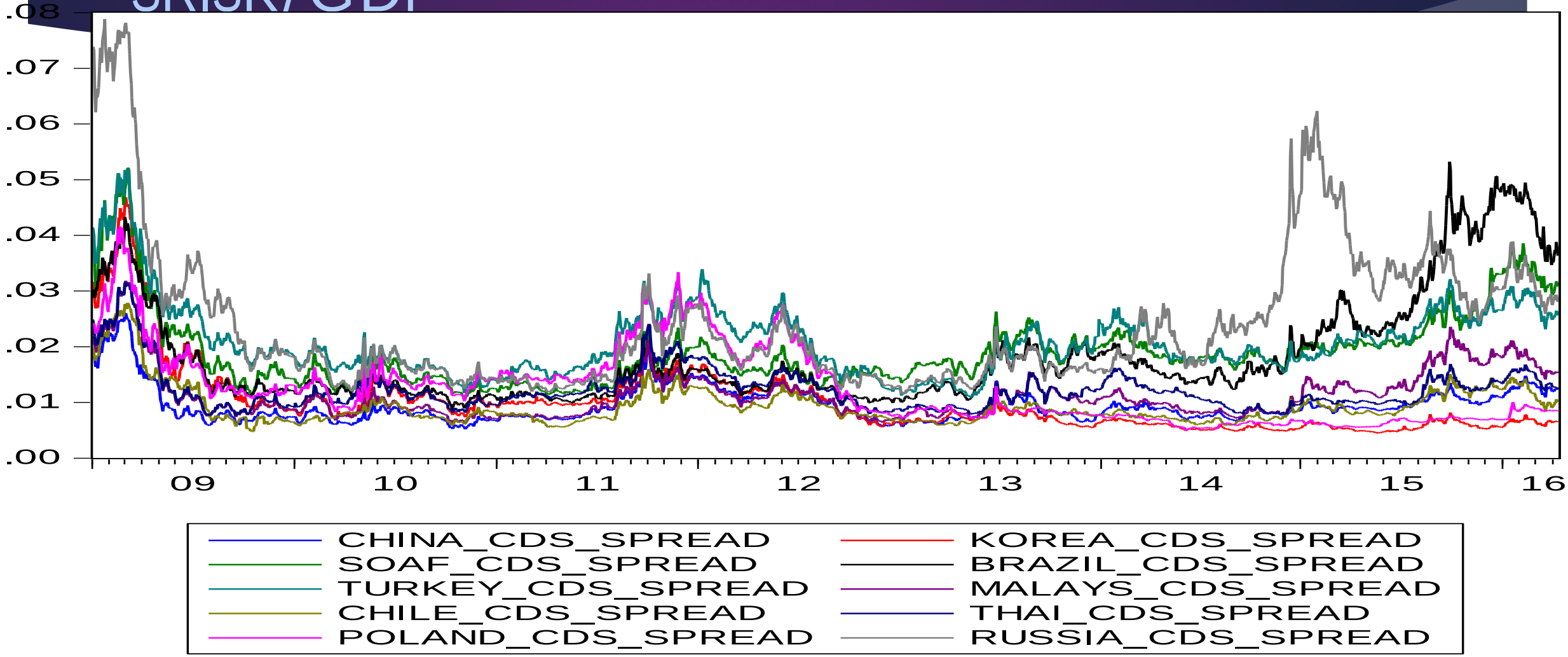
EMERGING MARKET SRISK/GDP



EMERGING MARKET SRISK



EMERGING MARKET SPREAD TOP 10 BY SRISK/GDP



EXAMINE A SAMPLE OF SOV CDS AND THEIR LEADING BANK

- Are movements in CDS spreads correlated with bank equity returns?
- Are there other factors
- How much of sovereign return does this explain?

CORRELATIONS 2009-2016, DAILY

- Aust -0.449351
- Belg -0.413410
- Finl -0.397241
- Italy -0.268580
- Japan -0.325627
- Spain -0.540478
- Swed -0.165074
- Cyprus 0.011930
- Phil -0.264116
- Leban -0.064422
- Romania -0.338415
- Russia -0.250357
- Slovak -0.029640
- SoAf -0.409742
- Turkey -0.478631
- Vietnam -0.106989

PRINCIPLE COMPONENTS

- 4 PRINCIPLE COMPONENTS EXPLAIN 92% OF THE LEVELS OF THE SPREAD.
- ONLY SHORT COMMON SAMPLE.

- 4 PRINCIPLE COMPONENTS EXPLAIN HALF THE VARIABILITY OF THE CHANGES IN SPREAD.
- ONLY SHORT COMMON SAMPLE.

SOVEREIGN CDS RETURN REGRESSION

Dependent Variable: D(AUST_SPREAD)
Method: Least Squares
Date: 04/14/16 Time: 14:04
Sample (adjusted): 1/05/2009 3/21/2016
Included observations: 1619 after adjustments

Variable	Coefficien...	Std. Error	t-Statistic	Prob.
C	-7.93E-06	8.09E-06	-0.980727	0.3269
BANK_AUSTRIA_RET	-4.67E-05	3.10E-06	-15.05051	0.0000
BANK_AUSTRIA_RET(-...	-2.34E-05	2.64E-06	-8.885452	0.0000
DLOG(VIX)	1.31E-05	0.000144	0.091071	0.9274
DLOG(_5YR)	-0.000558	0.000237	-2.359856	0.0184
DLOG(XLF)	-0.001372	0.000560	-2.451569	0.0143

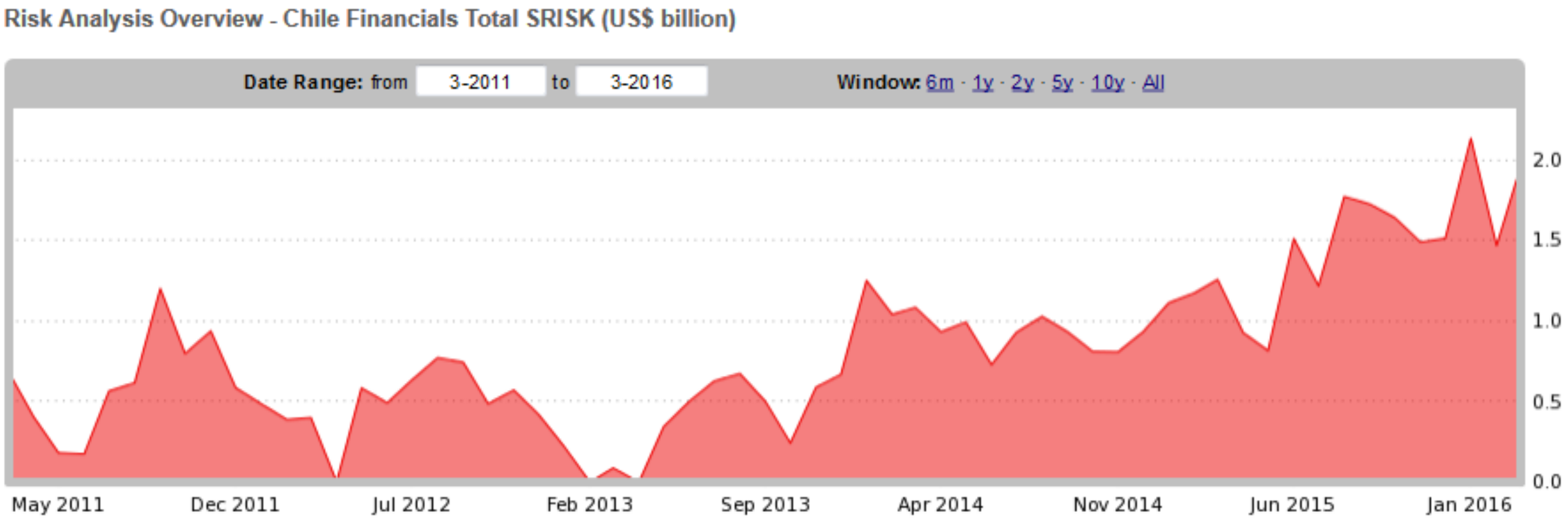
R-squared	0.227792	Mean dependent var	-1.28E-05
Adjusted R-squared	0.225398	S.D. dependent var	0.000369
S.E. of regression	0.000325	Akaike info criterion	-13.22123
Sum squared resid	0.000170	Schwarz criterion	-13.20125
Log likelihood	10708.58	Hannan-Quinn criter.	-13.21381
F-statistic	95.16302	Durbin-Watson stat	1.592127
Prob(F-statistic)	0.000000		

REGRESSION OF CHANGE IN SOV CDS

	BANK RET	BANK RET(-...	dlog(VIX)	dlog(5yr tre...	dlog(xlf)
austria	-15.05051	-8.885452	0.091071	-2.359856	-2.451569
belg	-13.63147	-4.383210	1.604804	-5.712369	-2.301114
cyprus	0.809927	1.048698	-0.267187	0.023663	-0.746931
finland	-13.60762	-8.856134	0.047842	-4.750401	-1.497378
italy	-8.880337	0.576561	5.052428	-9.993219	-2.383113
japan	-12.55211	-1.775866	3.049193	-0.773297	3.042989
lebenon	-3.199383	-0.992335	0.398439	-2.210439	-2.456217
philippines	-11.35023	0.472865	1.265422	-3.176849	-3.137561
romania	-12.10571	-2.593626	1.817539	-4.688122	-6.732249
russia	-9.231443	-2.589687	8.049532	-5.049959	-3.781978
slovak	-1.266103	0.018723	-0.142422	-2.562689	-6.477075
southafrica	-15.27680	-2.076106	5.792640	-3.903214	-4.861632
spain	-20.37498	-5.563785	1.845869	-6.960741	1.208703
sweden	-4.565255	-4.095060	-0.626713	-3.638830	-4.482636
turkey	-18.67392	-2.023831	5.076072	-5.465284	-8.224079
vietnam	-3.632560	-1.856002	3.247246	-2.681625	0.413732

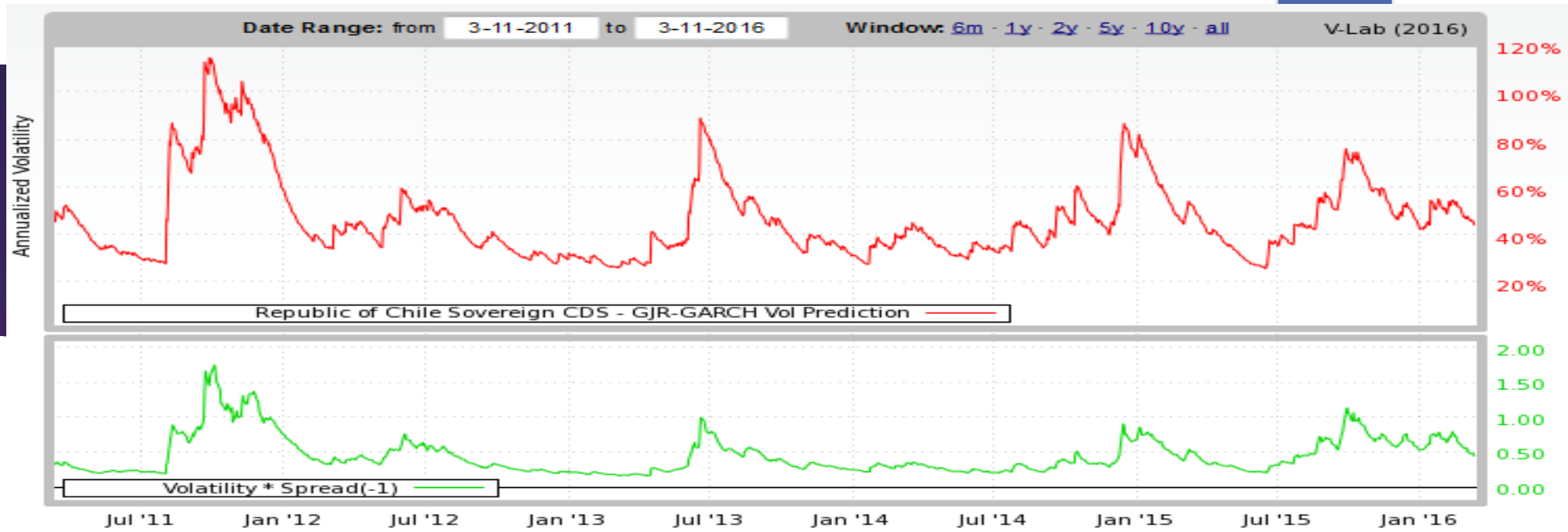
RELATIONS BETWEEN EQUITY VOLS AND CDS VOLS

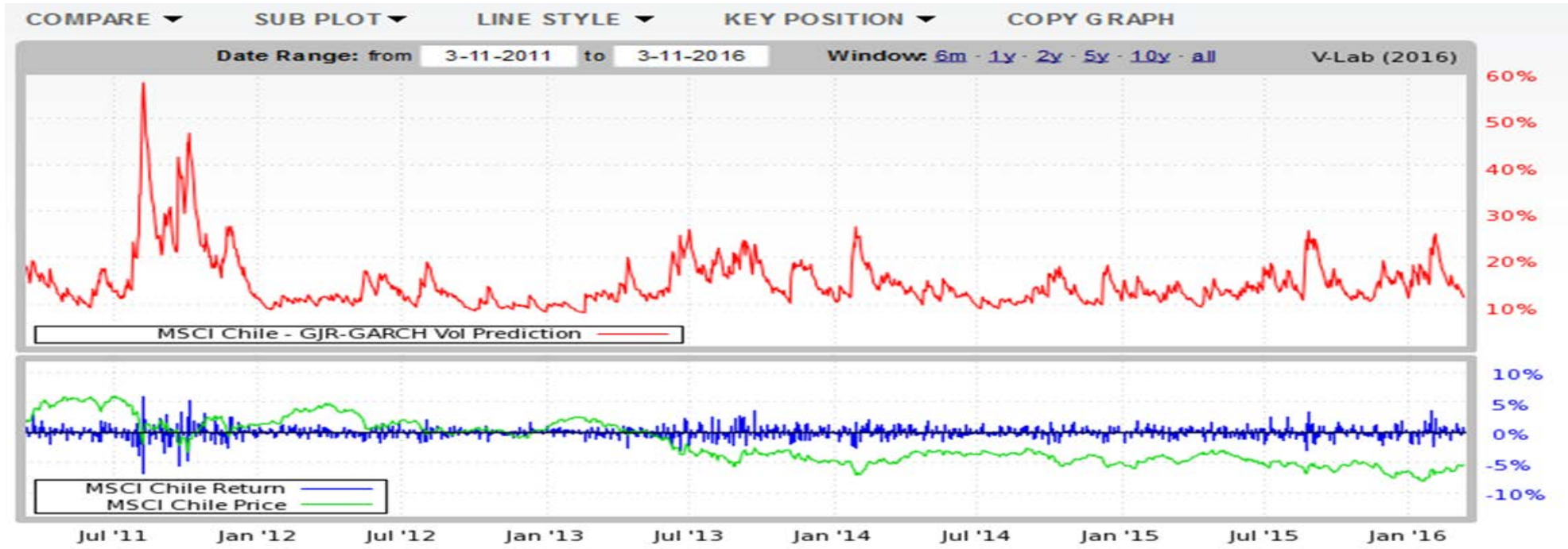
CHILE SRISK


Risk Analysis Overview - Chile Financials Total SRISK (US$ billion)
Date Range: from 3-2011 to 3-2016
Window: 6m · 1y · 2y · 5y · 10y · All
2.0
1.5
1.0
0.5
0.0
May 2011
Dec 2011
Jul 2012
Feb 2013
Sep 2013
Apr 2014
Nov 2014
Jun 2015
Jan 2016

CHILE

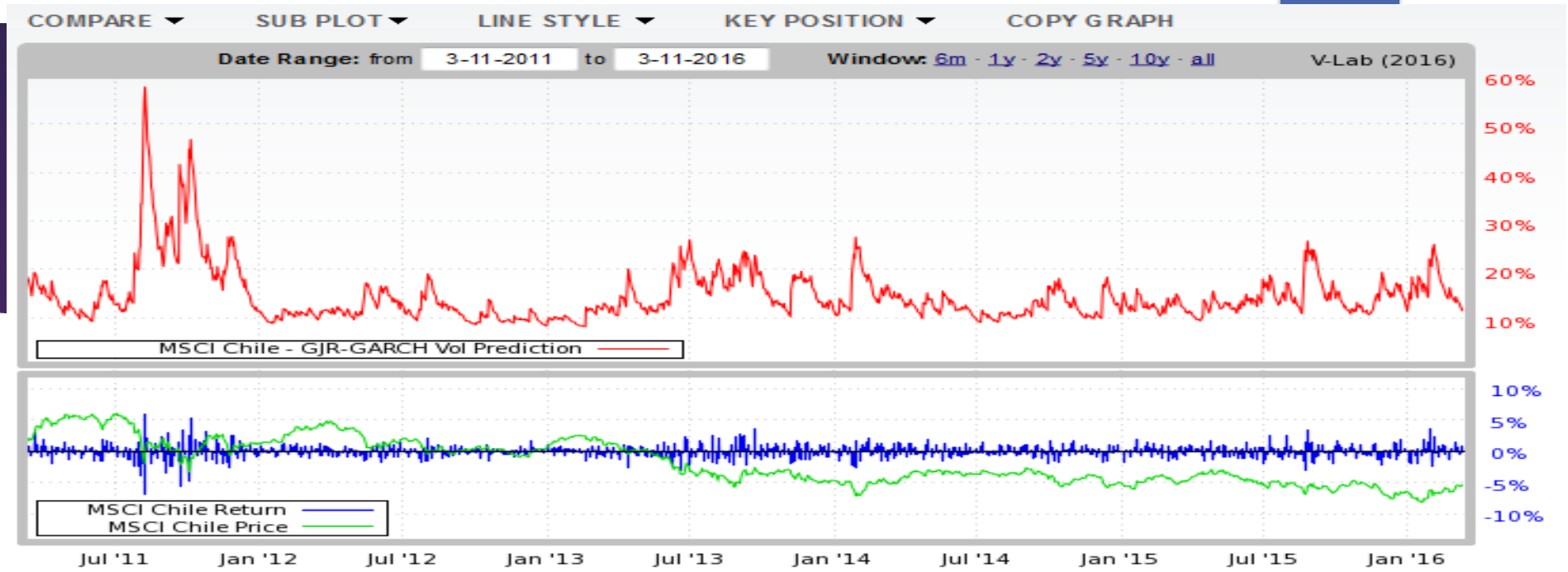
SOV CDS VOL AND EQUITY VOLS



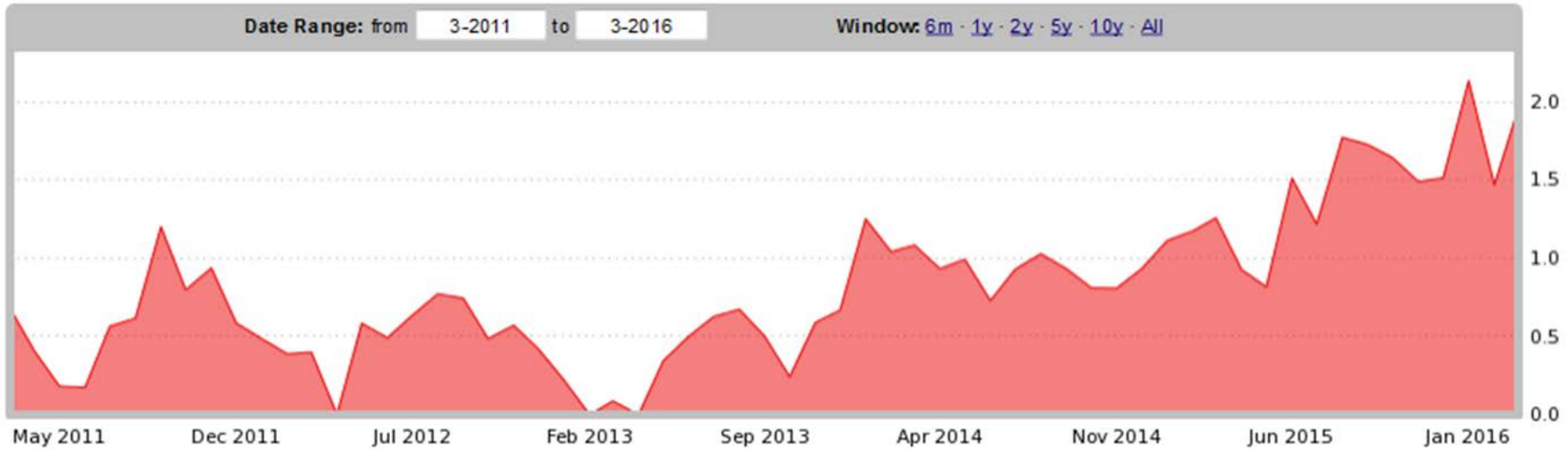


CHILE

EQUITY VOLS AND SRISK



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



DO VOLATILITIES MOVE TOGETHER?

- REGRESS THE LOG CHANGE IN SOV CDS VOLATILITY ON THE LOG CHANGE IN BANK EQUITY VOLATILITY

- 2009 – 2016, DAILY

NAME	VOL ELAST	TSTAT
austria	0.186328	4.412541
belg	0.333351	7.116344
cyprus	0.002353	0.070181
finland	0.092170	2.981221
italy	0.146930	4.203462
japan	0.408428	8.190193
lebenon	0.066776	1.859688
philippines	0.265700	3.228701
romania	0.045106	2.236675
russia	0.173495	5.174300
slovak	0.013566	0.359141
southafrica	0.489781	9.240274
spain	0.292098	10.69324
sweden	0.077081	2.390534
turkey	3.475486	10.22398
vietnam	0.026143	1.131532

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