

WHAT'S NEW IN V-LAB

ROB ENGLE



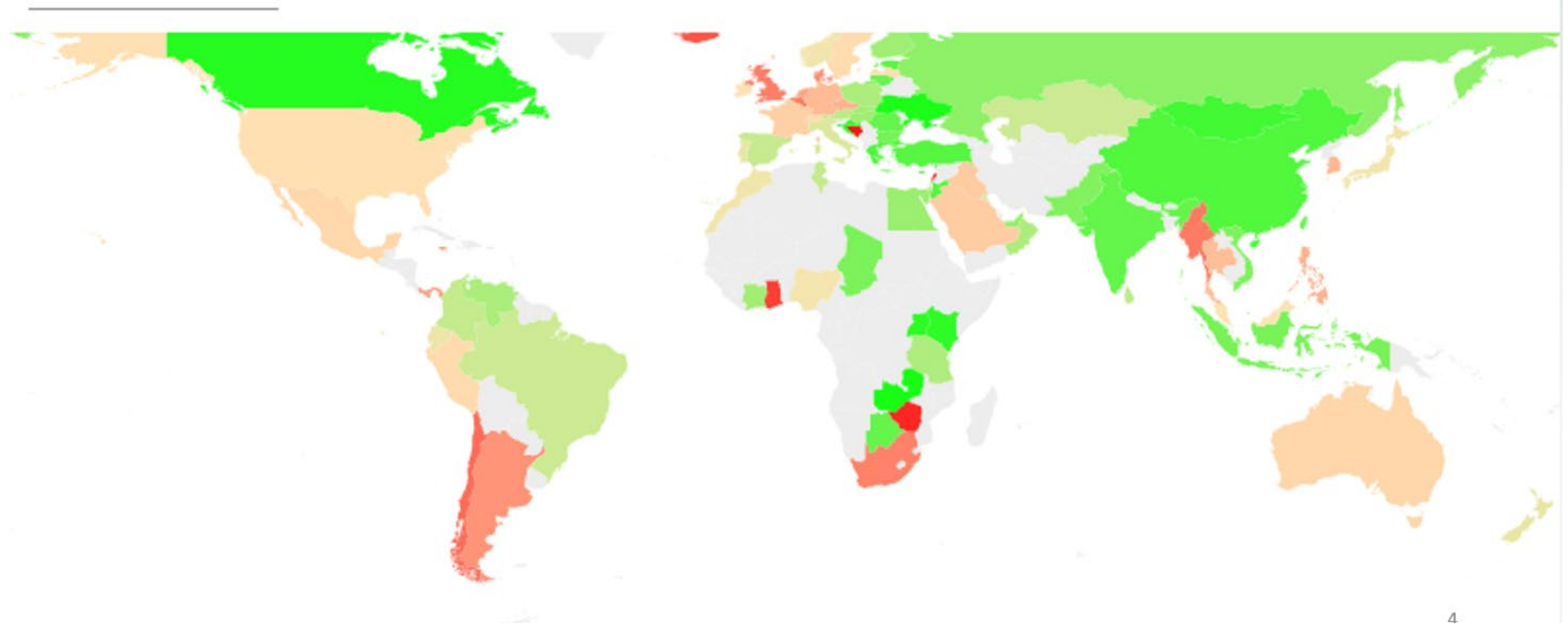
WHAT IS NEW IN V-LAB?

- V-LAB IS THE VOLATILITY AND RISK INSTITUTE'S WEB SITE THAT PRESENTS MANY FINANCIAL RISK MEASURES WITH DAILY UPDATES.
- WE HOPE THESE MEASURES WILL HELP INDIVIDUALS AND FIRMS HEDGE, MITIGATE OR TRANSFER THE RISKS THEY DO NOT WANT TO OWN.
- VLAB.STERN.NYU.EDU
- IT HAS SEVEN PRIMARY DISPLAYS
 - VOLATILITY ANALYSIS
 - CORRELATION ANALYSIS
 - SYSTEMIC RISK ANALYSIS
 - LONG RUN VaR ANALYSIS
 - LIQUIDITY ANALYSIS
 - FIXED INCOME ANALYSIS
 - CLIMATE RISK ANALYSIS
- TODAY WE WILL FIRST DISCUSS COVID-19 CASE STUDY PAGE

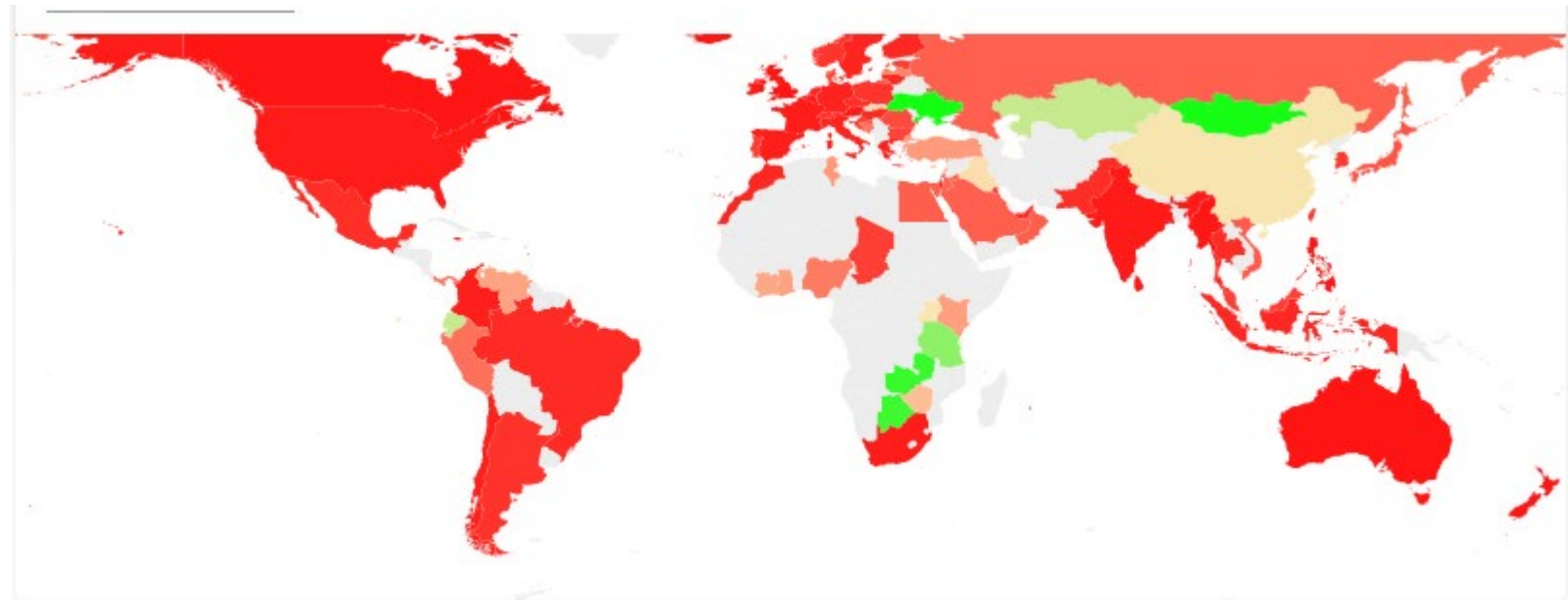
COVID-19 CASE STUDY

- We have seen dramatic swings in financial markets all over the world
- This page seeks to relate the financial changes to infection and death rates from a global perspective.

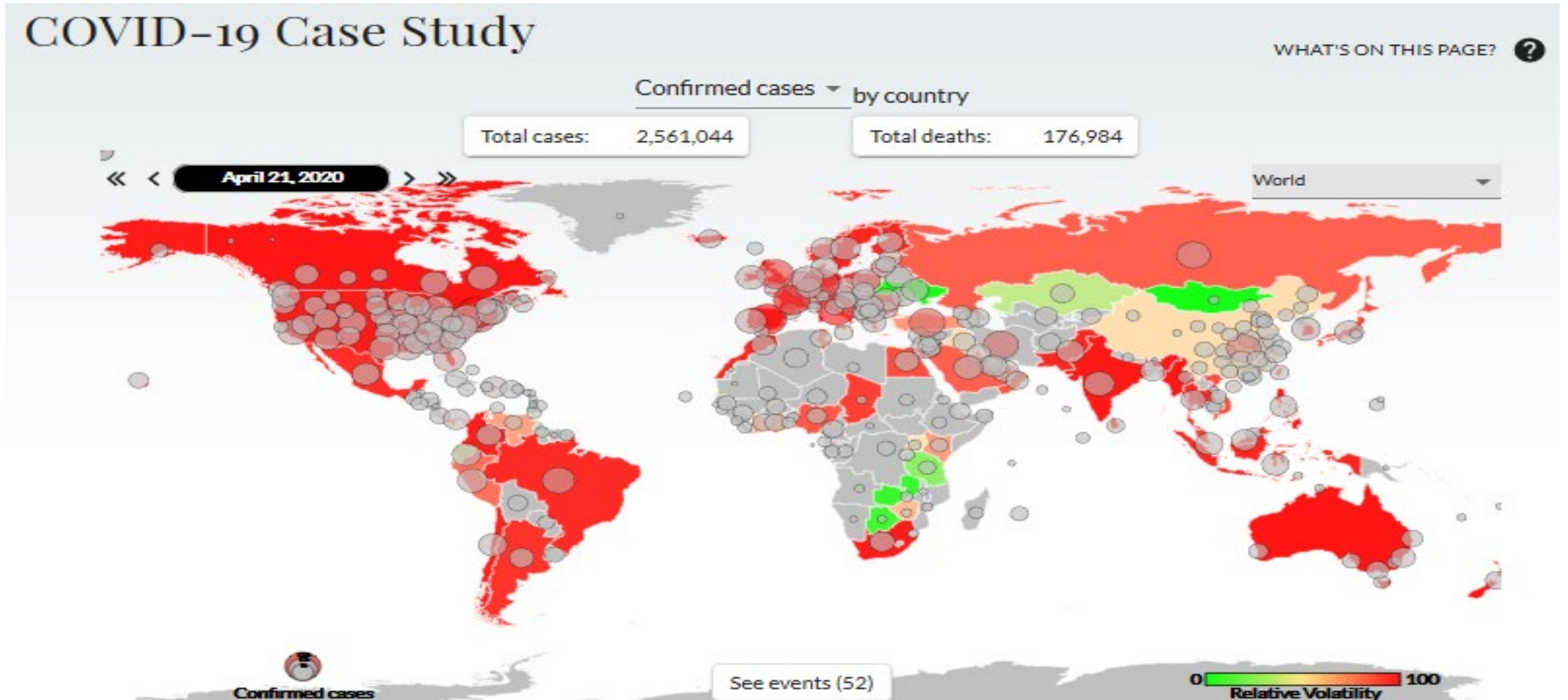
1/29/2020



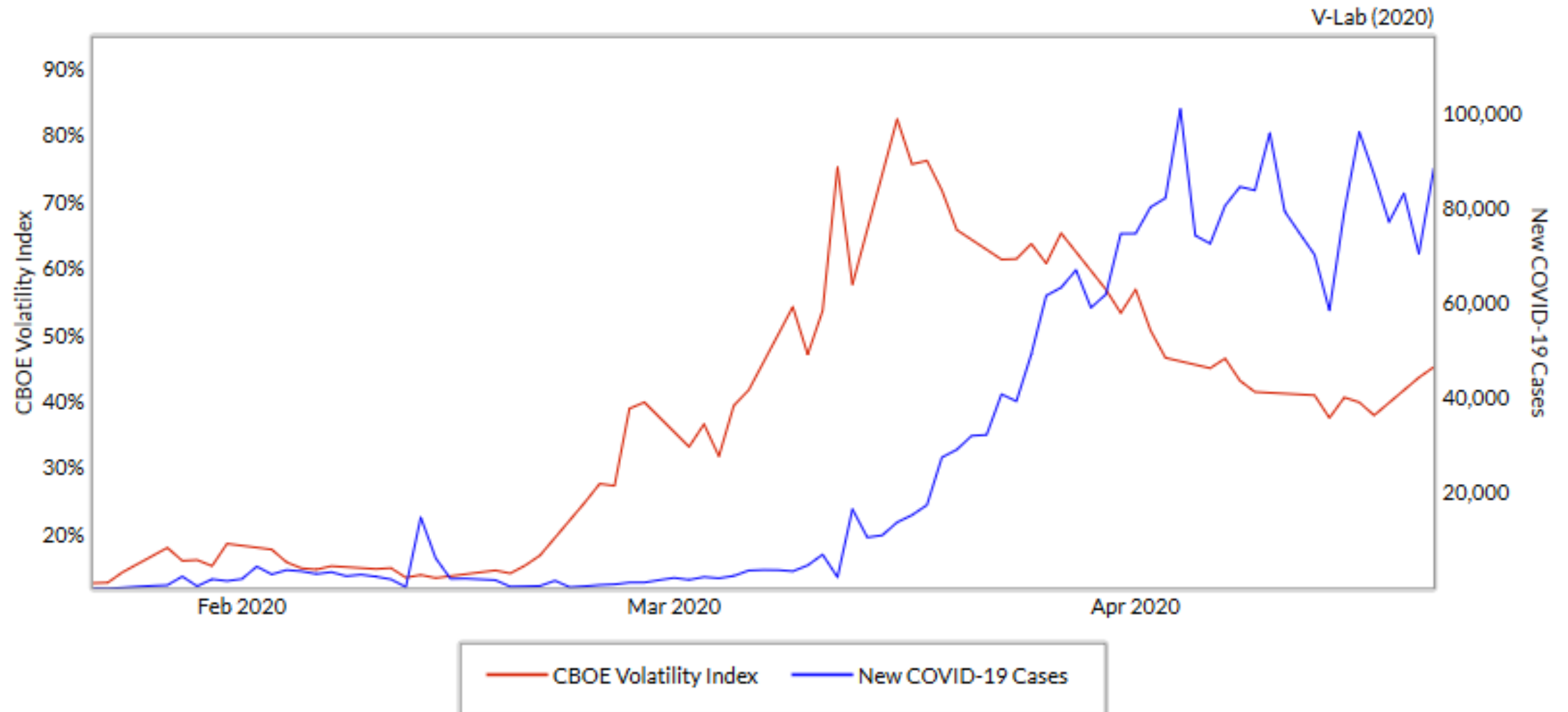
4/22/2020



ADDING CONFIRMED CASES TO VOLATILITY



VIX RISES WITH THE ACCELERATION OF NEW CASES



STATISTICAL MODELING OF THIS RELATION

- A PANEL REGRESSION MODELS THE RELATION BETWEEN COUNTRY EQUITY VOLATILITY AND MEASURES OF VIRUS INFECTION SINCE JANUARY.
- MODEL FEATURES CURVATURE OF NEW CASES, STRINGENCY OF POLICY, AND SPILLOVERS FROM GLOBAL INFECTIONS.

FEB 3 TO APRIL 17 FOR MANY COUNTRIES

All variables are based on 3day average log(ActiveCases) in Panel Regressions

with Time Fixed Effects OR Global ActiveCases & Curvature OR

USA ActiveCases & Curvature

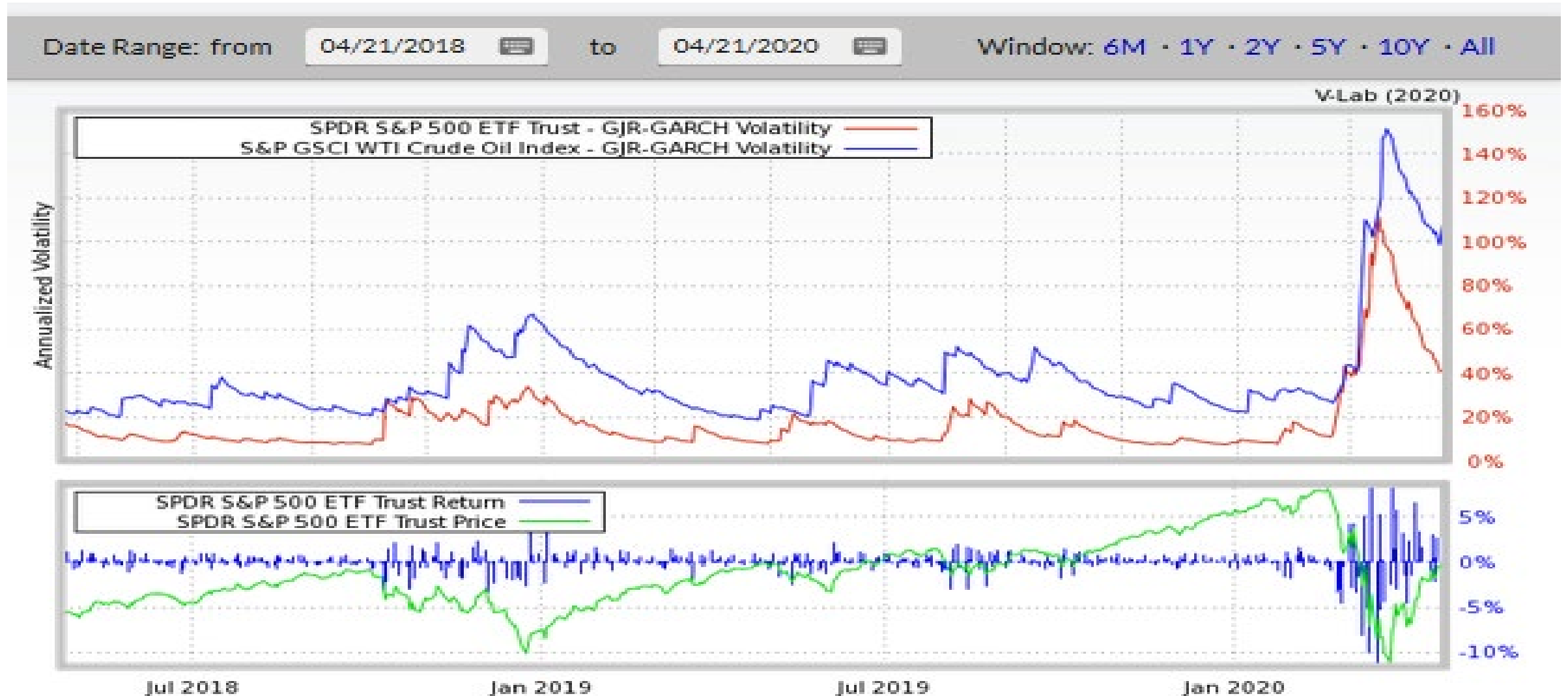
curvature(t)=logActiveCases(t)+logActiveCases(t-k)-2*logActiveCases(t-k/2), where
k=7

Model :			
<i>DVOL = b(1)LogActiveCases[t-1] + b(2)Curvature(A)[t-1] + const</i>			
	Model (SUS)	Model (GLB)	Model (TFE)
LogActiveCases[t-1]	3.276 [3.76]***	6.13 [9.69]***	3.529 [4.24]***
Curvature(A)[t-1]	2.689 [3.81]***	1.717 [3.15]***	1.158 [2.13]**
LogActiveCases - USA[t-1]	0.648 [0.97]		
Curvature(A) - USA[t-1]	3.046 [4.82]***		
LogActiveCases - Global[t-1]		-6.945 [-4.97]***	
Curvature(A) - Global[t-1]		42.288 [11.47]***	
Intercept	4.531 [2.29]**	82.324 [5.78]***	0.808 [0.63]
Time Fixed Effects	No	No	Yes
R-Sq-within	0.335	0.502	0.637
R-Sq-between	0.276	0.267	0.284
N	4472	4472	4472

NOTE: SUS is Spillover from US. GLB is GlobalCases & Global Infection Rates. TFE is time fixed effects

VOLATILITY and CORRELATION

VOLATILITY OF S&P500 and WTI



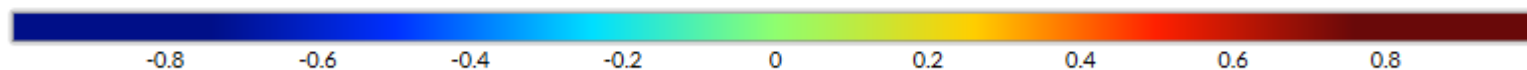
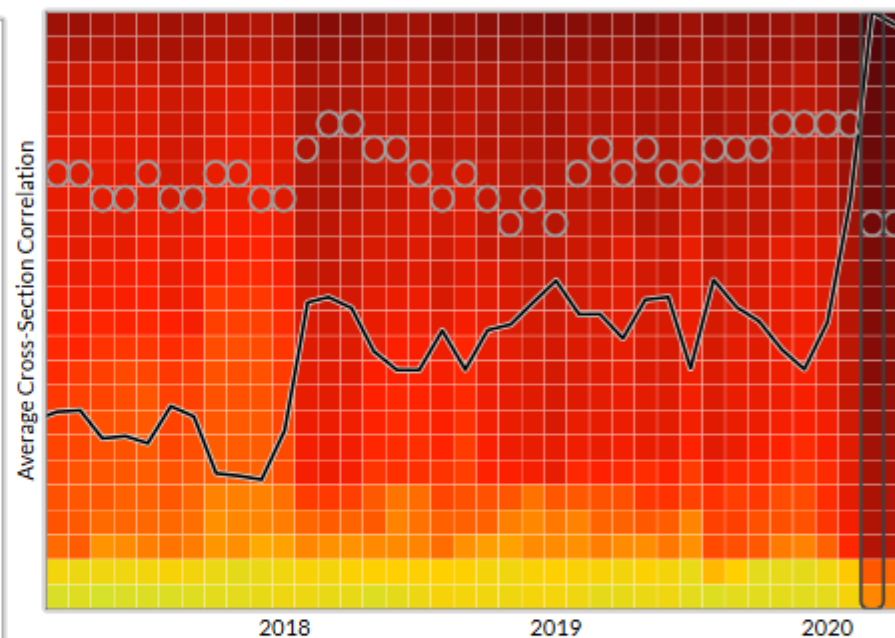
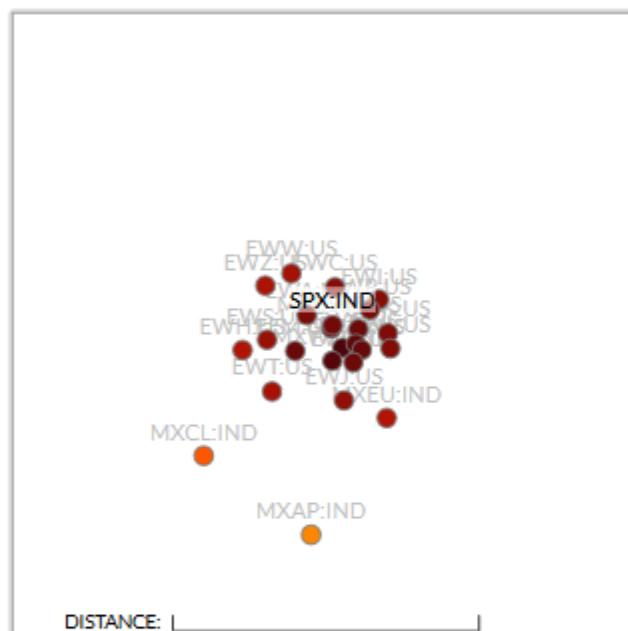
CORRELATION

- NEW NON-LINEAR SHRINKAGE ESTIMATOR FOR VERY LARGE DYNAMIC CORRELATION MATRICES from Engle, Ledoit and Wolf(2019)
- NEW PRESENTATION FEATURING
 - MULTIDIMENSIONAL SCALING
 - CORRELATIONS OF ONE ASSET WITH ALL OTHER ASSETS
 - AVERAGE OF ALL PAIRS
- Equity correlations are high and rising
- Commodity correlations are low and rising as oil volatility rises
- Exchange rate correlations are falling as some currencies become havens
- US asset class correlations are rising

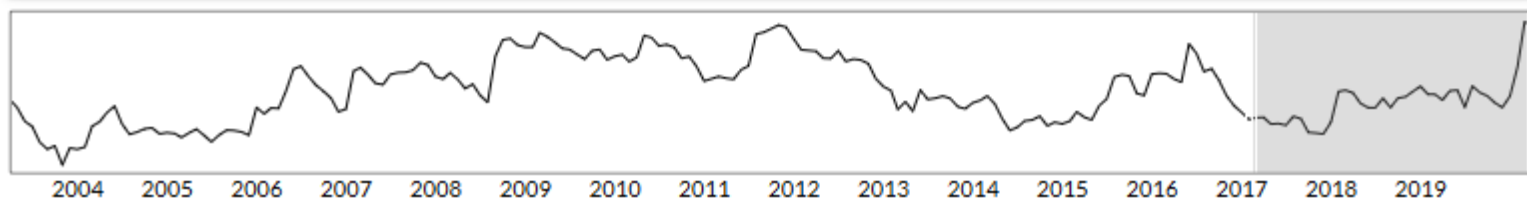
Date: March 2020

S&P 500 Index Average Correlation: 0.7891

Average Correlation: 0.7467



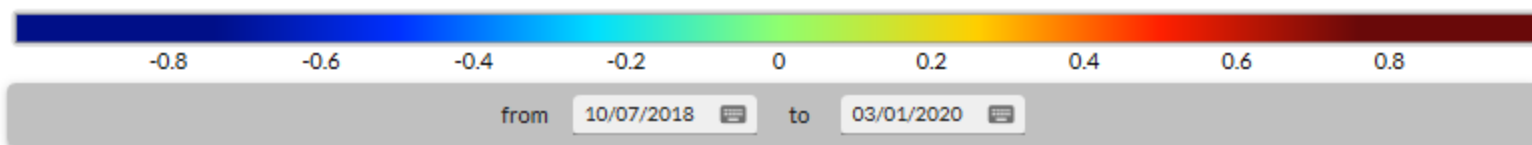
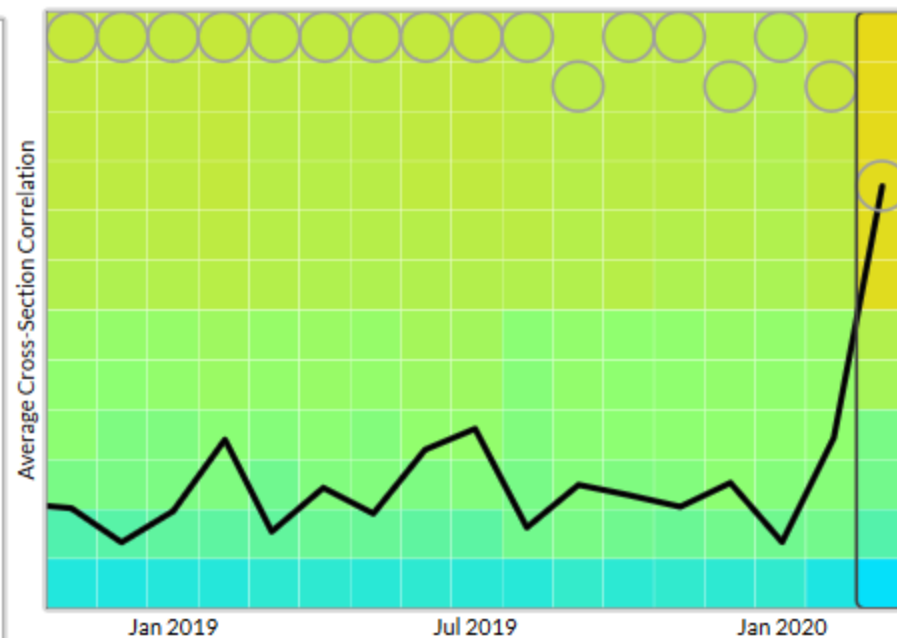
from 02/07/2017 to 04/01/2020



Date: March 2020

S&P 500 Index Average Correlation: 0.2960

Average Correlation: 0.1099



Date:

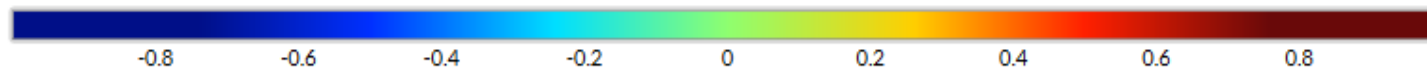
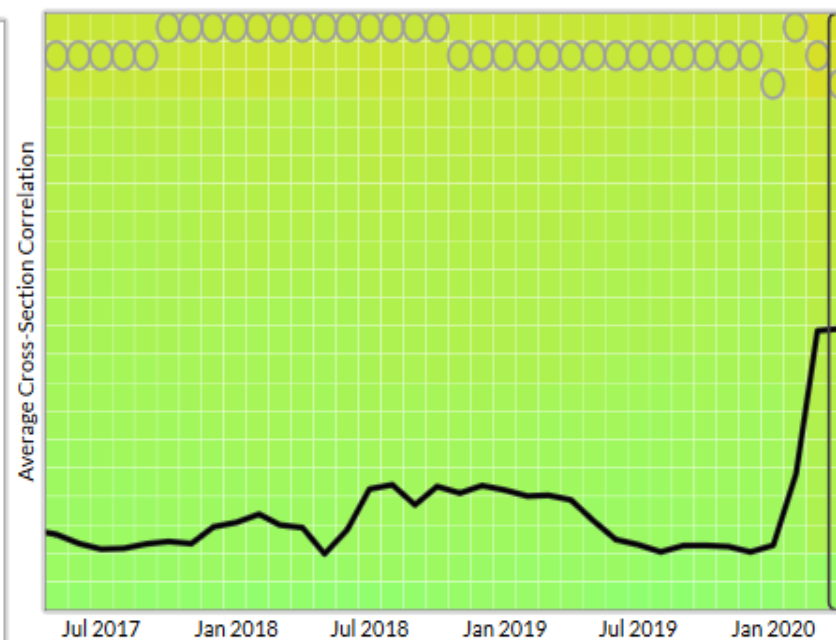
April 2020

S&P GSCI WTI Crude Oil Index Average Correlation:

0.2481

Average Correlation:

0.1531



from 04/04/2017 to 04/01/2020



Date:

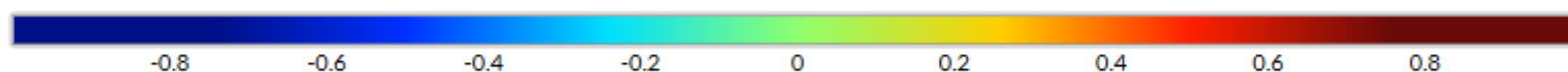
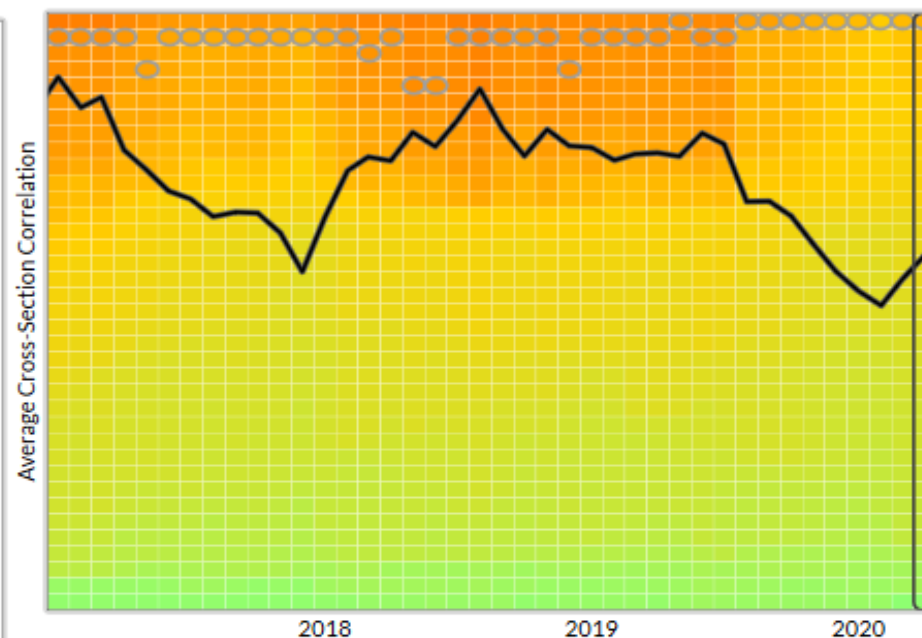
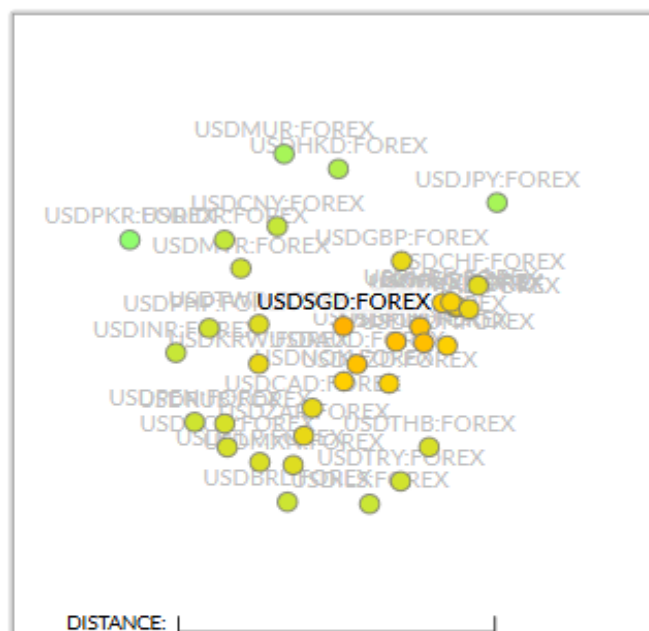
April 2020

US Dollar to Singapore Dollar Average Correlation:

0.4329

Average Correlation:

0.2853



from 12/21/2016 to 04/01/2020





SYSTEMIC RISK

DEFINITION: SRISK is the number of dollars that would be needed to recapitalize a financial institution so that it can continue to function normally if there is a collapse of the global equity market like in the financial crisis.

UNITED STATES

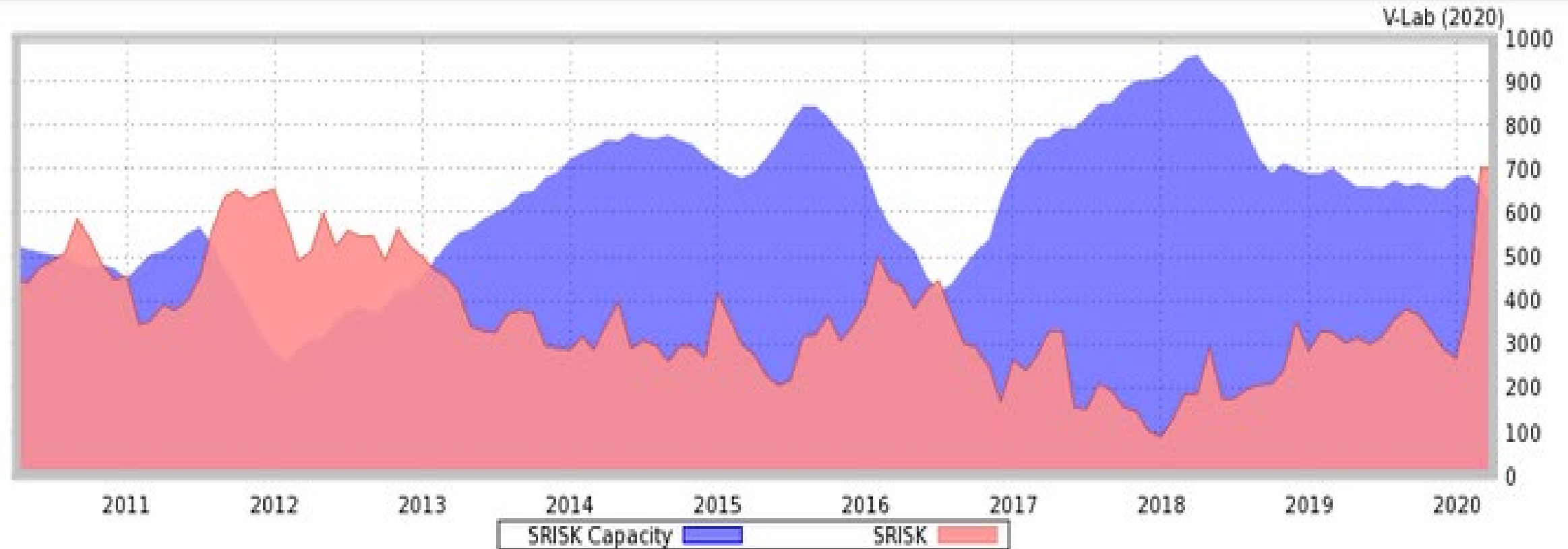
Risk Analysis Overview - United States Financials Total SRISK (US\$ billion)

Date Range: from 04/22/2010

to

04/22/2020

Window: 6M · 1Y · 2Y · 5Y · 10Y · All



GLOBAL SRISK

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

Date Range: from 01/01/1990

to

04/22/2020

Window: 6M · 1Y · 2Y · 5Y · 10Y · All



IMPLICATIONS

- GLOBAL SRISK IS AS HIGH AS IT HAS EVER BEEN
- HOWEVER \$1 TRILLION IS CHINA WITH STATE OWNED BANKING SYSTEM
- THE LARGEST EUROPEAN BANKS ARE HIGHLY UNDERCAPITALIZED AND SURVIVE BASED ON IMPLICIT GOVERNMENT GUARANTEES
- US BANKS, JAPANESE AND UK BANKS HAVE BEEN GIVEN BIG BACKSTOPS AND TOLD TO CONTINUE LENDING.
- CONSEQUENTLY, RAPID POLICY RESPONSE MAKES THE BANKS LESS LIKELY TO CAUSE FURTHER DAMAGE.

GEOPOLITICAL RISK



GEOVOL

- GEOVOL IS A VOLATILITY FACTOR WHICH MAKES VOLATILITIES OF A BROAD SET OF FINANCIAL ASSETS GO UP AT THE SAME TIME.
- GEOVOL MAY BE DUE TO POLITICAL OR ECONOMIC OR MILITARY OR NOW HEALTH NEWS
- V-LAB WILL ESTIMATE GEOVOL FOR SEVERAL COLLECTIONS OF ASSETS. THE FIRST IS A SET OF COUNTRY EQUITY ETFS.
- THE NEXT SLIDE SHOWS THE CURRENT ESTIMATES.

Date	GEOVOL	avgRet	Event
2016-06-24	50.619	-7.341	Brexit
2020-03-09	49.957	-9.634	COVID - All of Italy is locked down, Saudi Arabia / Russia oil price war
2019-08-05	40.314	-2.575	China Trade War - China devalues its currency
2001-09-17	29.733	-8.630	Market reopens after Sept 11th
2007-02-27	26.637	-6.002	Chinese stock market crash, Cheney assassination attempt, drop in durable goods orders
2015-08-24	22.561	-4.146	Flash Crash
2017-04-24	22.542	2.070	Syrian sanctions
2016-11-09	18.569	-1.285	Trump Elected
2011-08-05	18.261	0.443	Rumors of US credit rating downgrade
2018-04-09	17.698	0.293	North Korea open to denuclearization, Missiles hit Syrian air base
2020-03-12	17.579	-12.083	COVID - Day after Trump address -- blocks visitors coming in from Europe
2020-03-13	16.757	6.169	COVID - US declares national state of emergency
2017-05-18	16.589	-0.683	Justice dept appoints Mueller to head Russia investigation
2008-10-10	15.024	-2.648	Global Financial Crisis
2014-12-17	14.904	2.086	Peshawar Pakistan school attacks, US/Cuba re-establish diplomatic relations
2001-03-12	14.678	-3.429	NASDAQ Market Crash
2002-07-23	14.564	-3.076	Israeli/Palestinian Tension, Stock Market Crash
2001-01-03	14.120	3.721	Fed surprise interest rate cut
2010-05-10	13.983	6.252	EU and IMF reveal a \$1 trillion plan to avoid a European debt crisis
2020-03-19	13.572	1.448	COVID - Coronavirus relief package signed night prior

FACTOR LOADINGS ON GEOVOL

- 1st Principal Component 0.266
- ACWI MSCI 0.253
- iShares MSCI France ETF 0.222
- iShares MSCI Spain Capped ETF 0.202
- iShares MSCI Italy Capped ETF 0.200
- iShares MSCI Germany ETF 0.192
- iShares MSCI Netherlands ETF 0.190
- iShares MSCI Malaysia ETF 0.182
- iShares MSCI Finland ETF 0.175
- iShares MSCI Belgium Capped ETF 0.175
- iShares MSCI Thailand ETF 0.174
- SPDR S&P 500 ETF Trust 0.162
- VanEck Vectors Egypt Index ETF 0.155
- iShares MSCI Austria ETF 0.151
- iShares MSCI Indonesia ETF 0.147
- iShares MSCI South Korea ETF 0.146
- iShares MSCI Singapore Capped ETF 0.141
- Global X MSCI Portugal ETF 0.136
- iShares MSCI Japan ETF 0.134
- iShares MSCI China ETF 0.133
- iShares MSCI Sweden Capped ETF 0.133
- Global X MSCI Greece ETF 0.131
- iShares MSCI Taiwan Capped ETF 0.130
- iShares MSCI Chile ETF 0.128
- iShares MSCI Hong Kong ETF 0.128
- iShares MSCI Norway ETF 0.127
- iShares MSCI Philippines ETF 0.123

- iShares MSCI United Kingdom ETF 0.123
- iShares MSCI Mexico Capped ETF 0.122
- iShares MSCI Colombia ETF 0.121
- iShares MSCI Switzerland Capped ETF 0.118
- iShares MSCI Brazil Capped ETF 0.117
- iShares MSCI Israel ETF 0.115
- iShares MSCI South Africa ETF 0.115
- Global X MSCI Nigeria ETF 0.114
- iShares MSCI Qatar ETF 0.114
- iShares MSCI Denmark ETF 0.113
- iShares MSCI Australia ETF 0.113
- iShares MSCI Canada ETF 0.112
- iShares MSCI Russia ETF 0.109
- iShares MSCI Ireland ETF 0.106
- iShares MSCI Turkey ETF 0.101
- iShares MSCI India ETF 0.095
- VanEck Vectors Vietnam ETF 0.083
- iShares MSCI Poland ETF 0.082
- iShares MSCI Peru ETF 0.079
- iShares MSCI New Zealand ETF 0.069
- Global X MSCI Pakistan ETF 0.053

CLIMATE RISK



PERFORMANCE METRICS UPDATE

- Green Fund performance metrics: return, Sharpe, 3 Factor FF alpha, beta
- Update using investible factors. ETFs for market, HML, SMB allows up to date performance measure.
- In development phase: Climate news measures are used to see which funds appreciate when there is substantial climate news and which depreciate.
- News metrics are based on daily measures of NYT climate coverage.

Cos-sim and tag index are two measures of climate news. We continue to improve these.

Security	Return	Volatility	Sharpe Ratio	Correlation		α
				Cos Sim	↓ Tag Index	
Gabelli ESG Fund Inc	-13.52%	28.64%	-0.48	-0.016	0.142	-2.59 (-1.11)
Invesco Solar ETF	15.15%	47.14%	0.32	0.165	0.123	23.16 (0.86)
KraneShares MSCI China Environment Index ETF	-10.44%	28.72%	-0.37	0.227	0.123	-1.63 (-0.09)
BlackRock Equity Dividend Fund	-11.67%	29.57%	-0.40	0.083	0.115	0.48 (0.16)
Amplify Advanced Battery Metals and Materials ETF	-40.58%	36.19%	-1.13	0.163	0.115	-36.84 (-1.86)
Walden International Equity Fund	-9.65%	23.58%	-0.42	0.065	0.113	-1.62 (-0.32)
Calvert International Equity Fund	-4.07%	26.10%	-0.16	0.062	0.104	-0.34 (-0.06)
Thornburg Better World International Fund I	-8.10%	25.53%	-0.32	0.038	0.097	-1.73 (-0.28)

