Evolution and behaviour of European volatility: VSTOXX®

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VSTOXX® and the US market

- Eurex recognized the US volatility market as a strategic area of growth upon receiving no action relief for the VSTOXX® futures in 2012

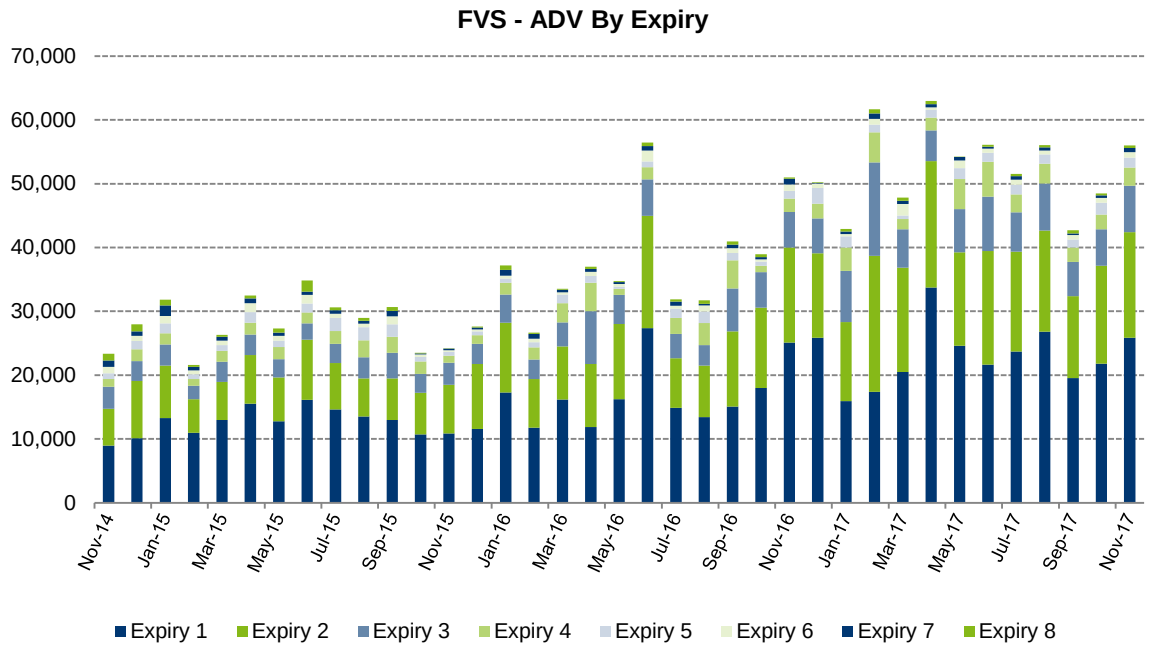
- Shortly thereafter, the exchange put in place a strategy to grow liquidity based upon changing market structure to open up the VSTOXX® market to US participants.

  - Step One: Grow the liquidity in the VSTOXX® futures
  - Step Two: Convert the VSTOXX® Options to Options on Futures for CFTC-approval
  - Step Three: Work with a ETP provider to list a VSTOXX® ETN on a US-based exchange

- US participants have been keen to trade VSTOXX® to access European volatility
  - The index is constructed in a similar fashion as the VIX
  - The VSTOXX® is more reactive to European-specific events
  - The VSTOXX®/VIX spread is mean reverting

A path to liquidity: VSTOXX® market structure initiatives

A path to liquidity: grow liquidity in the underlying



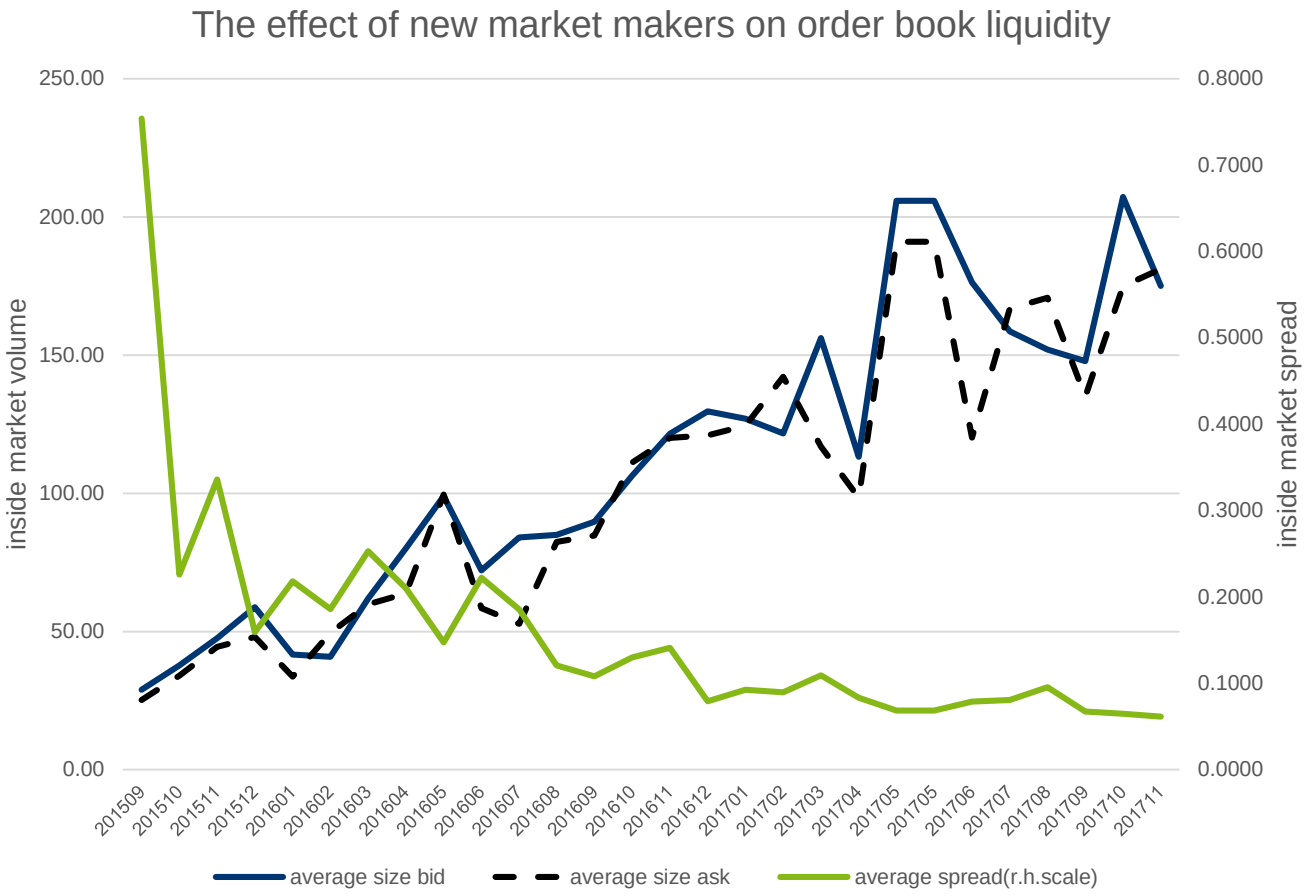
	FVS ADV
2012 ADV	15,000
2013 ADV	21,000
2014 ADV	27,500
2015 ADV	29,500
2016 ADV	38,200
2017 ADV	52,205

Orderbook volume growth 2012 vs 2017

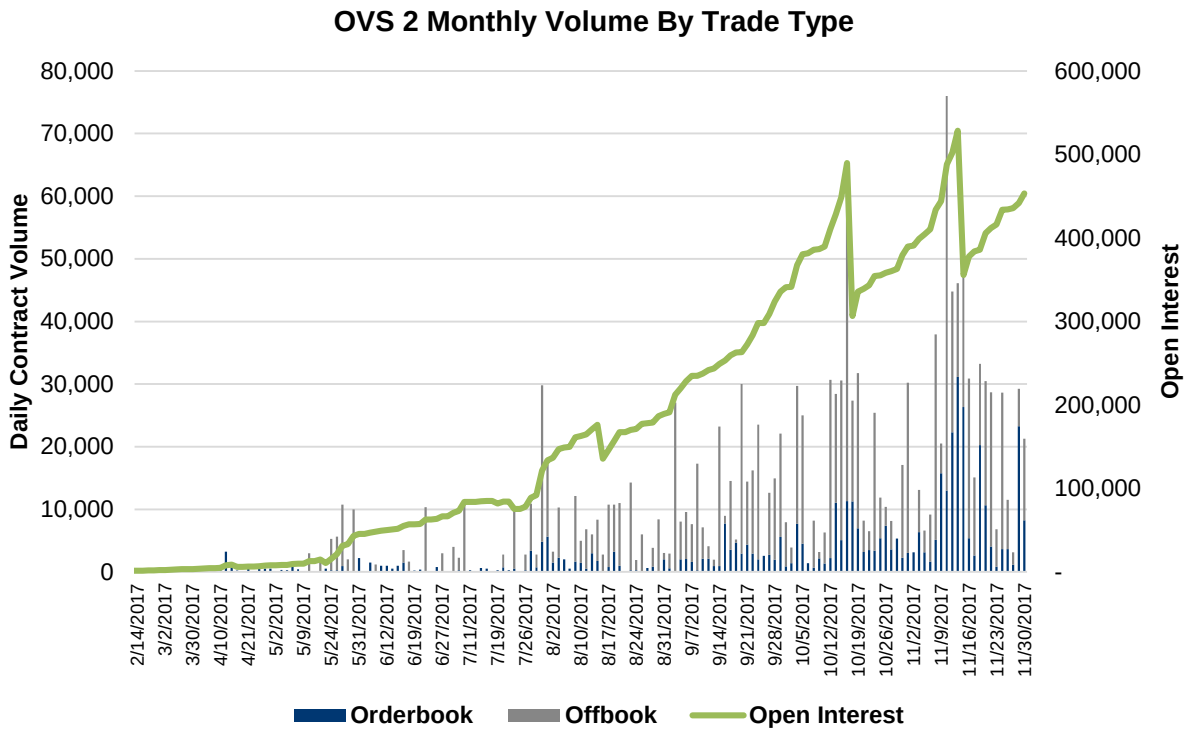
FVS	2012	2017
Order book	71.93%	84.67%

- August 1, 2012: VSTOXX® futures received CFTC no-action relief. Volume doubled from month to month as Eurex saw an inflow of volume from US-based customers previously restricted from the contract
- March 1, 2015: Extend VSTOXX® futures market hours to overlap US trading hours
- November 1, 2015: Eurex revamped the VSTOXX® futures market making program adding six new market making participants improving order book liquidity.

A path to liquidity: grow liquidity in the underlying



A path to liquidity: open VSTOXX® Options to US participants



	OVS2 ADV
2017* ADV	22,776

Orderbook volume 2017

FVS	2017
Order book	33.36%

*since October 2017

- The market is growing but remains event driven, the next level of growth is expected from systematic flow
- 51 members are active now in OVS2 – the same level as before the French election period
- Flow has increased from new participants based in the US as investors are able to access the CFTC compliant markets

Evolution and behaviour of European volatility: VSTOXX®

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Evolution and behaviour of European volatility: VSTOXX®

- Past performance is not necessarily indicative of future results.
- There is risk of loss when investing in futures and options.
- Futures & options can be a volatile and risky investment; only use appropriate risk capital; this investment is not for everyone.
- The opinions expressed are solely those of the author and are only for educational purposes. Please talk to your financial advisor before making any investment decisions.

Mark Shore's bio

- Over 30 years experience in the futures markets/ alternative investments
- Undergrad DePaul University; MBA University of Chicago; Doctoral candidate in applied research
- Former COO of VK Capital (a wholly owned $300 million AUM CTA subsidiary of Morgan Stanley)
- Former Head of Risk at Octane Research, $1.1 billion AUM
- Adjunct Professor, DePaul University
- Contributing Author to two Wiley & Sons books on hedge funds & commodities
- Contributing Writer: Eurex, CBOE, CBOE Futures, MicroCap Review, Swiss Derivatives Review, Seeking Alpha, Prime Meridian Capital Management, Coquest Advisors
- Board Member Arditti Center for Risk Mgmt; PRMIA Chicago Steering Committee, NIBA Board of Directors, QWAFAFEW Chicago Steering Committee
- Director of Educational Research, Coquest Advisors LLC
- Hosted an internet talk show on alternative investments "Skewing Your Diversification"
- Founded consulting/research firm Shore Capital Research LLC
    - Research of markets & trading strategies
    - Due diligence of managers
    - Business development of alternative investments
    - Educational workshops
    - Research & expert witness testimony for capital market litigation

VSTOXX® volatility index derivatives

- VSTOXX® Spot (V2X)
- VSTOXX® Futures (FVS)
- VSTOXX® Options (OVS) – ended in Sept 2017
- (New) Options on VSTOXX® Futures (OVS2) – began Feb 2017

VSTOXX® spot and futures

	VSTOXX® Futures (Eurex)
30 Day Forward	Yes
Annualized Implied Volatility of	EURO STOXX 50® Index
Ticker Symbol for Spot & Futures	V2X (spot) & FVS (futures)
Currency	Euro
Futures Began Trading (trades 8 expirations)	2009
Average Daily Trading Volume (As of November 2017) **	52,580
Long negative volatility of underlying Market	Yes
Mean Reverting	Yes
Top range	45 to 50
Median*	22.8
Bottom range	13 to 17

*Spot price 1/4/1999 to 8/14/17
** Eurex website

STOXX®

- STOXX Limited formed in 1997. A leading index specialist based in Zurich, Switzerland (stoxx.com)
- EURO STOXX 50® Index “represents the performance of the 50 largest companies in terms of free-float market cap” of up to 11 Eurozone countries.
- Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain
- Composition is reviewed every September
- A smaller and less diversified index than S&P 500
- Heavily weighted by financial stocks ~(25%)

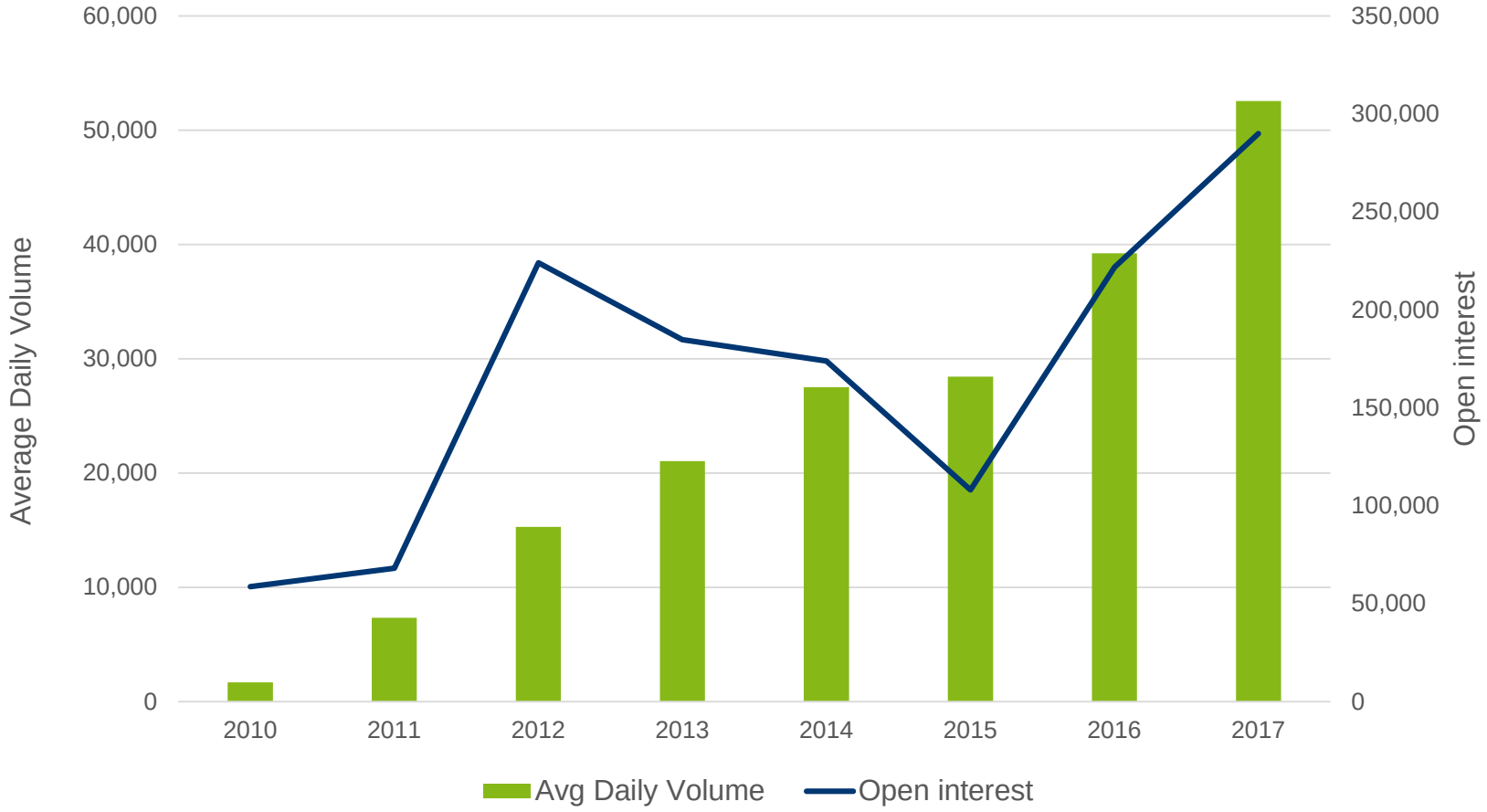
Source: www.stoxx.com, as of Oct 31, 2017

EURO STOXX 50® index sector weightings

Sector	Weighting	Country	Weighting
Banks	15.5%	France	36.5%
Industrial Good & Services	10.8%	Germany	33.1%
Personal Household Goods	9.2%	Spain	10.4%
Chemicals	9.0%	Netherlands	10.1%
Technology	7.3%	Italy	4.7%
Healthcare	7.2%	Belgium	3.1%
Insurance	6.9%	Ireland	1.1%
Oil & Gas	6.2%	Finland	1.0%
Utilities	5.2%		
Automobiles & Parts	5.1%		
Food & Beverage	4.9%		
Telecommunications	4.8%		
Construction & Materials	4.1%		
Retail	2.2%		
Media	0.9%		
Real Estate	0.9%		
Total	**100%**	**Total**	**100%**

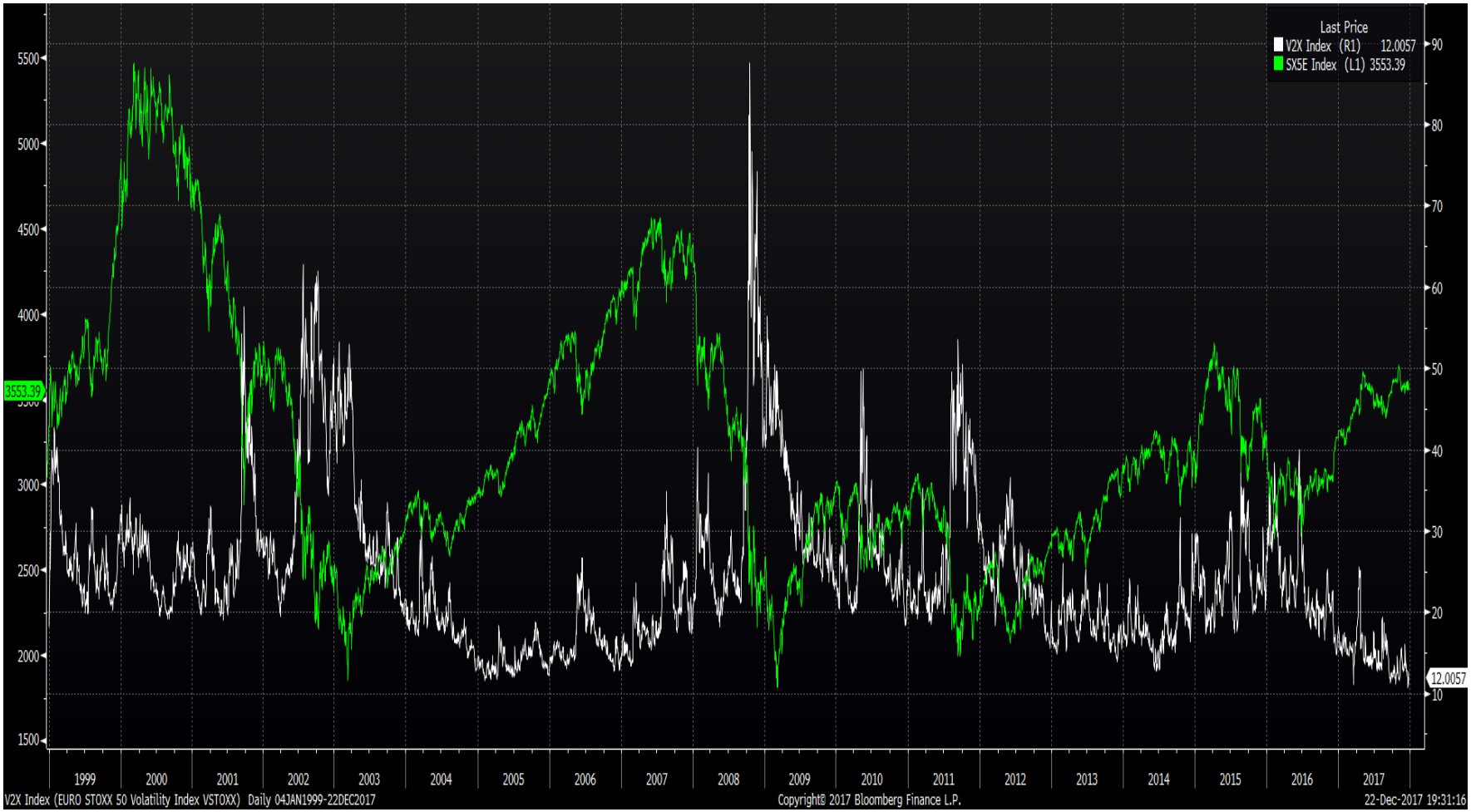
Source: https://www.stoxx.com/document/Bookmarks/CurrentFactsheets/SX5GT.pdf
As of October 31, 2017

VSTOXX® volume & open interest (2010 to November 2017)



Source: Eurex website

VSTOXX® spot index and EURO STOXX 50® spot index Jan 1999 to Dec 22, 2017

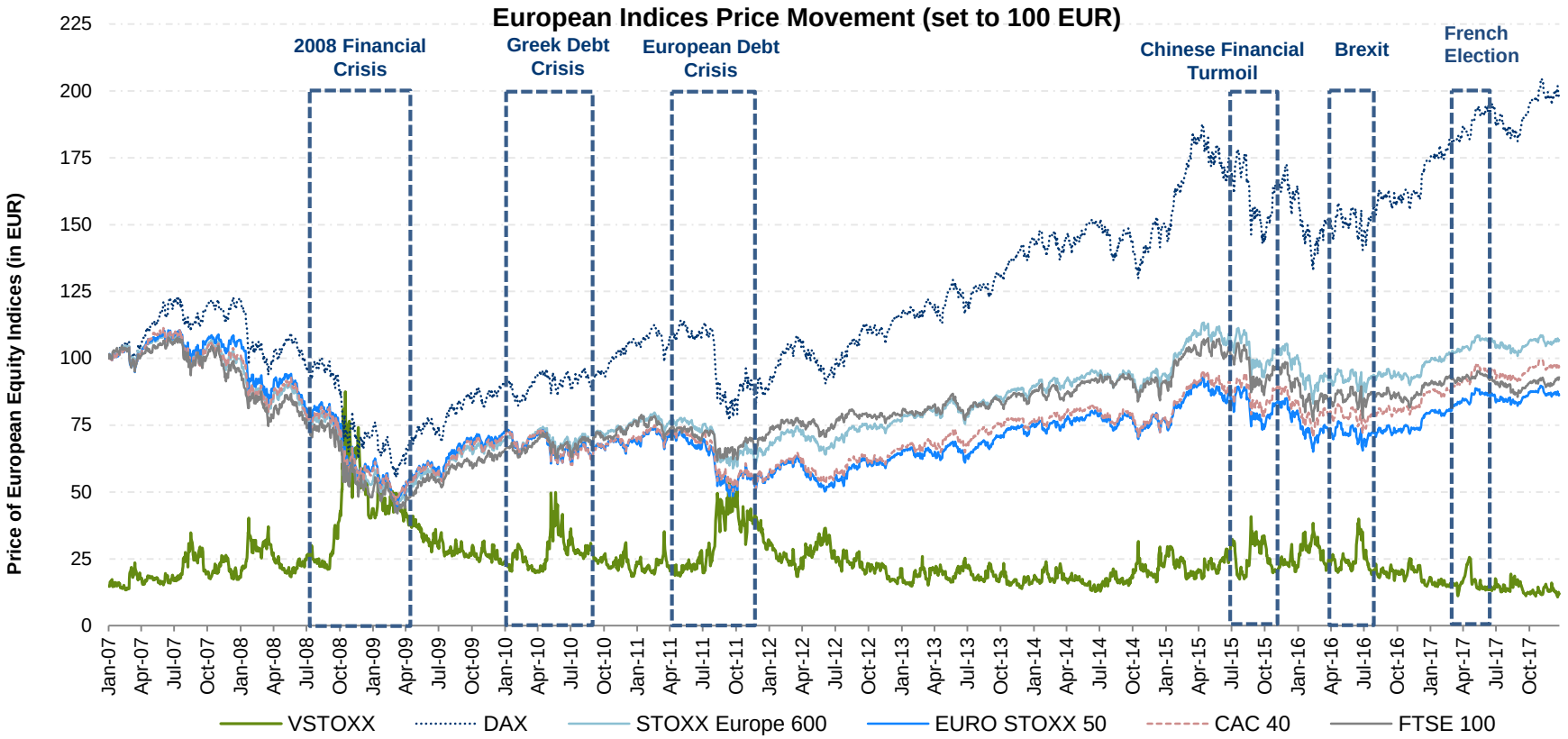


Source: Bloomberg data

Utilizing VSTOXX® derivatives

- Hedging
- Directional trading
- Intra-market spreads = term structure
- VSTOXX® Futures / VIX futures spreads (relative value trading)
- Sentiment indicator
- Trading CFTC – certified options on the futures contracts

Recent volatility events: Spot prices of EURO STOXX 50® Index, DAX index, CAC 40 index, STOXX® Europe 600 index FTSE 100 index and VSTOXX® (Jan 2007 - Dec 22, 2017)



Source: “Utilizing a European volatility index for Pan European volatility”, M. Shore 2016

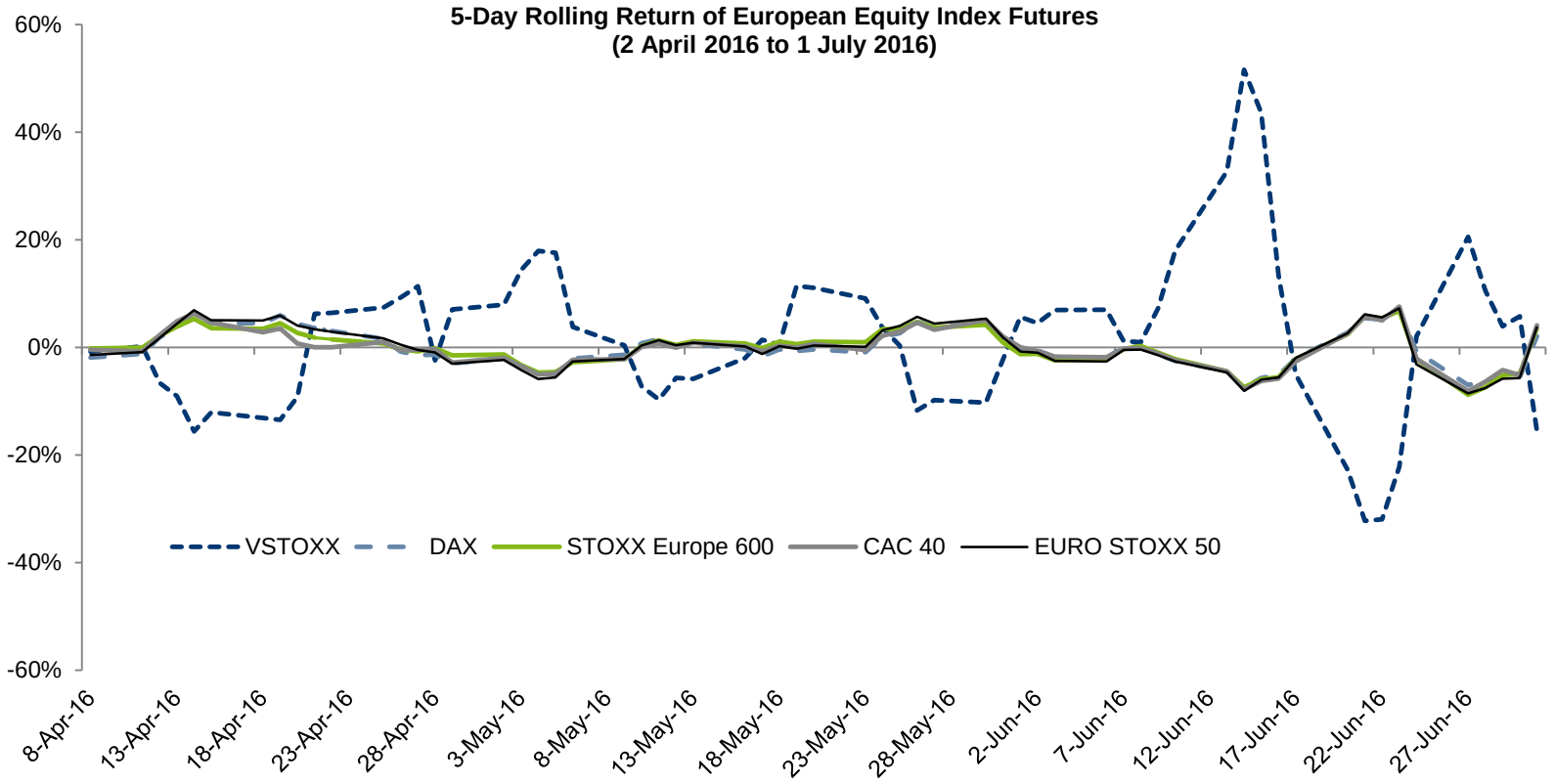
Can you apply VSTOXX® derivatives to other European equity indices?

- Pan-European Correlation Spot Prices (2 Jan 2007 to 30 Sept 2016 in EUR)

	VSTOXX®	EURO STOXX 50® Index	CAC 40	FTSE 100	DAX	STOXX® Europe 600
VSTOXX®	1.00	-0.77	-0.76	-0.67	-0.74	-0.76
EURO STOXX 50® Index		1.00	0.98	0.85	0.95	0.96
CAC 40			1.00	0.87	0.93	0.97
FTSE 100				1.00	0.82	0.94
DAX					1.00	0.93
STOXX® Europe 600						1.00

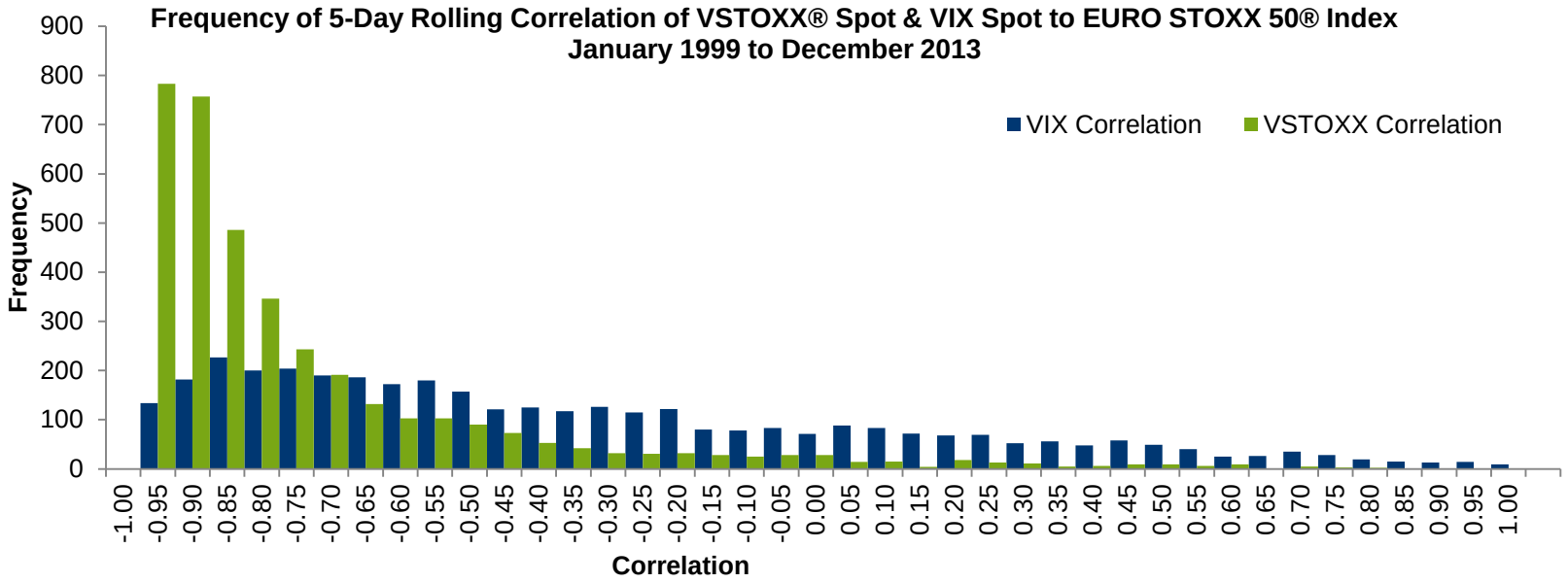
Source: “Utilizing a European volatility index for Pan European volatility”, M. Shore 2016

European equity front months future returns vs VSTOXX® futures front month returns



Source: Utilizing a European volatility index for Pan European volatility", M. Shore 2016

Why VSTOXX® is a better proxy for European volatility

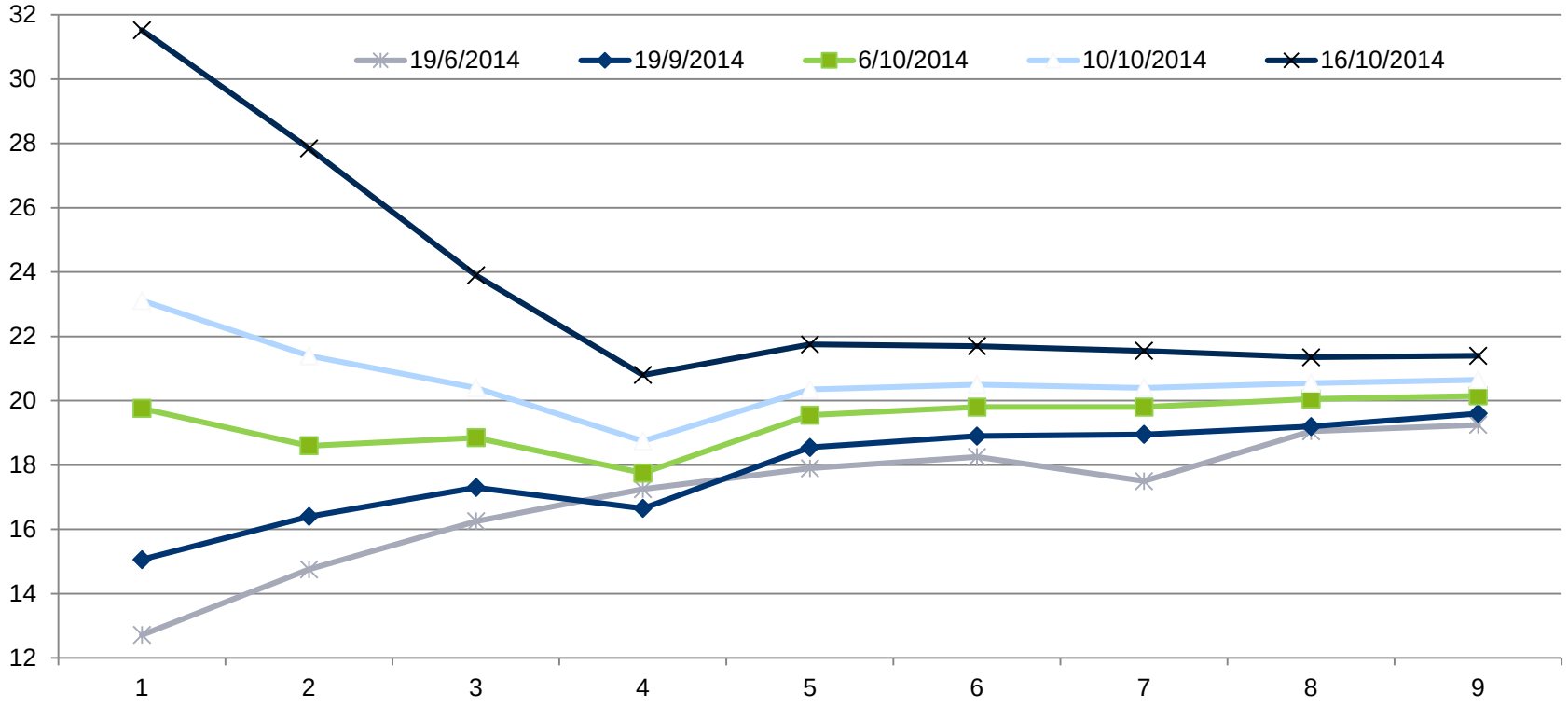


Correlations of VSTOXX® spot and VIX spot to EURO STOXX 50® during -2% or greater equity market corrections

	Average	Maximum	Minimum
5 Day Rolling Period			
VSTOXX ® spot correlation	-0.85	0.57	-1.0
VIX spot correlation	-0.51	1.0	-1.0
One-Month Rolling Period			
VSTOXX ® spot correlation	-0.83	-0.28	-0.97
VIX spot correlation	-0.51	0.27	-0.87

Source: “Noisy short-term correlations in global volatility index futures: why trading one regional index futures market may not be enough”, M. Shore 2014

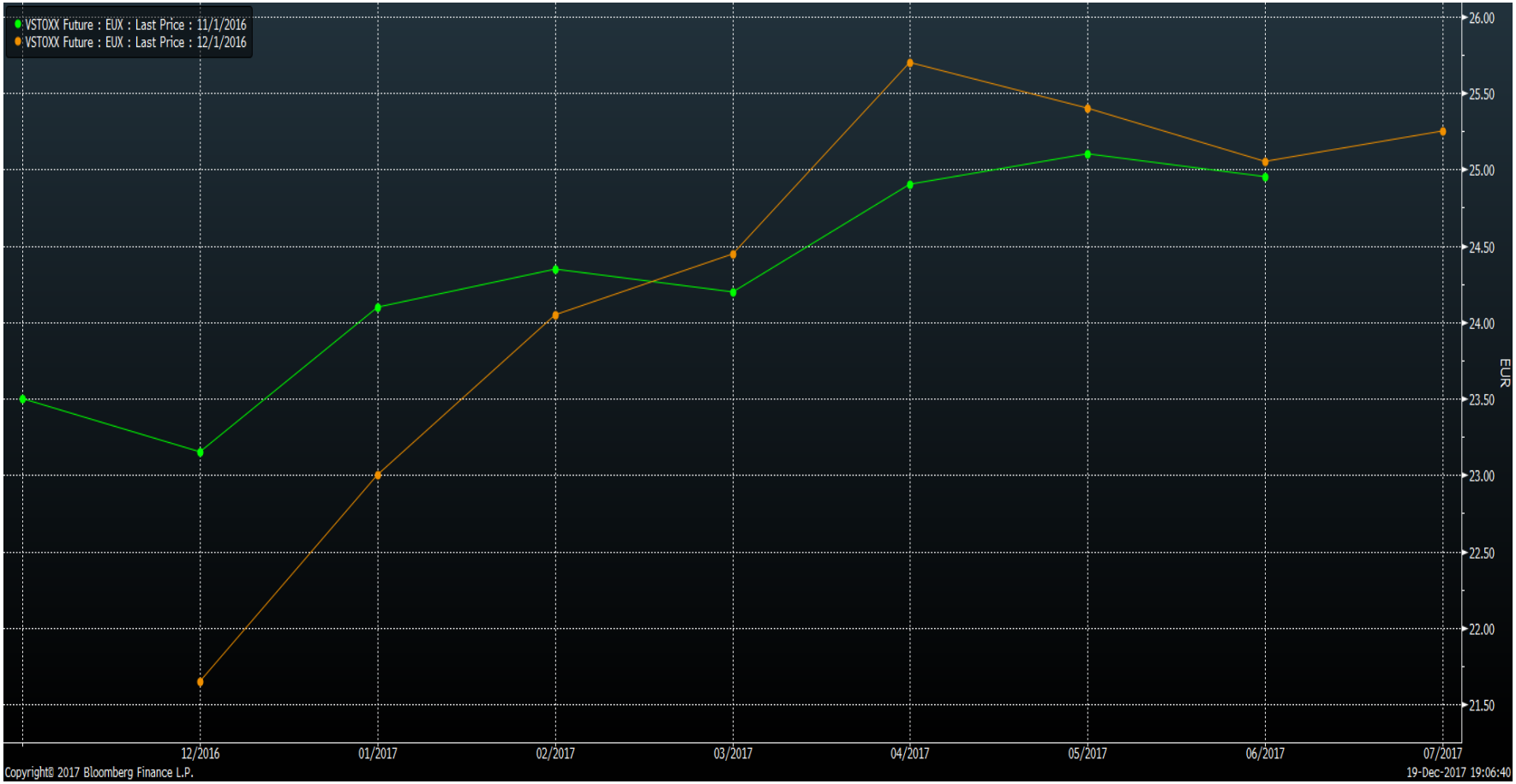
Contango to Backwardation: evolution of the volatility regime shift of VSTOXX® spot and VSTOXX® futures



- VSTOXX® is in contango 70% of the time since 2011: source Eurex Exchange

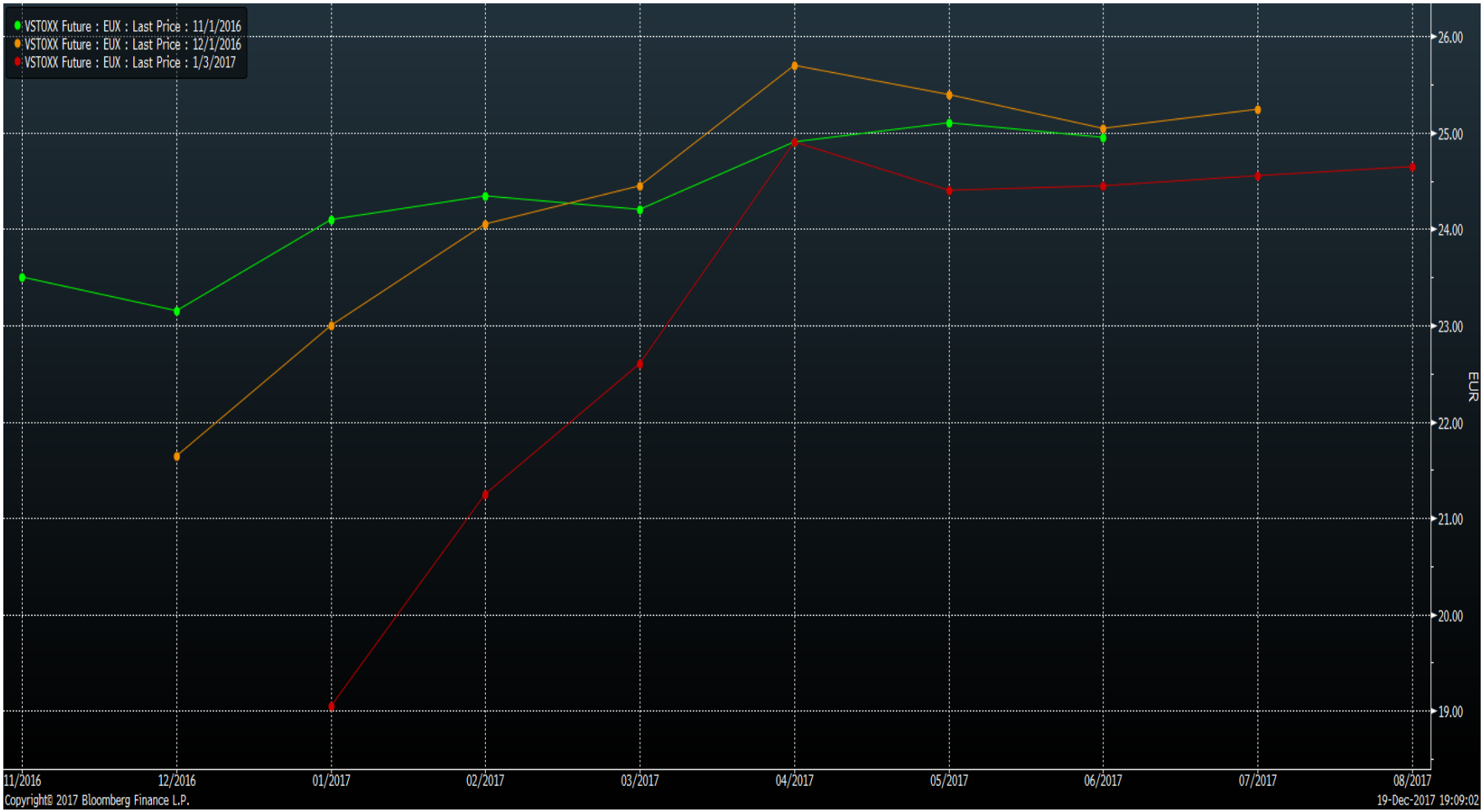
Source: “An analysis of why volatility indexes are relevant”, M. Shore 2014

VSTOXX® futures curves regarding 2017 French election (Dec 2016)



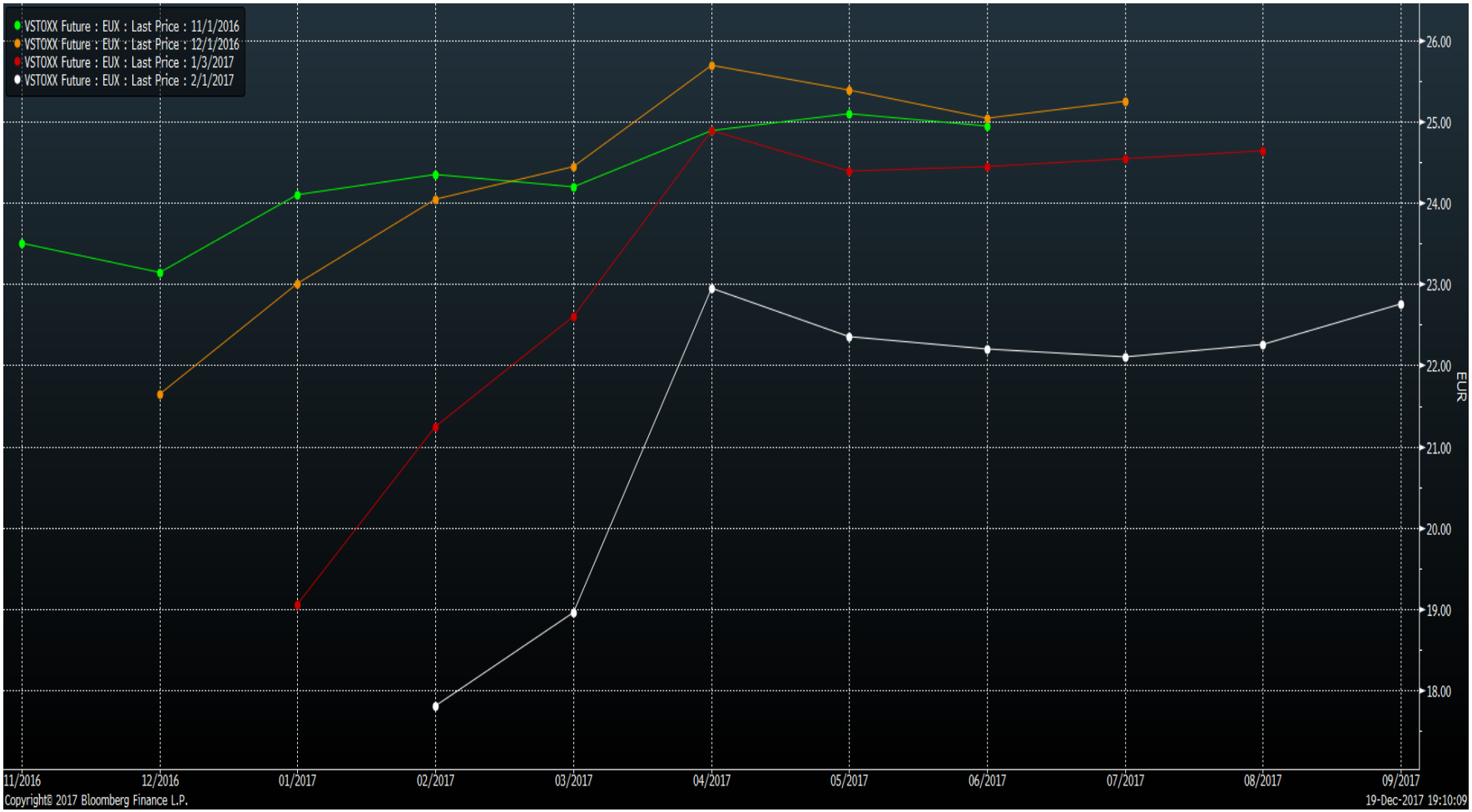
Source: Bloomberg data

VSTOXX® futures curves regarding 2017 French election (Jan 2017)



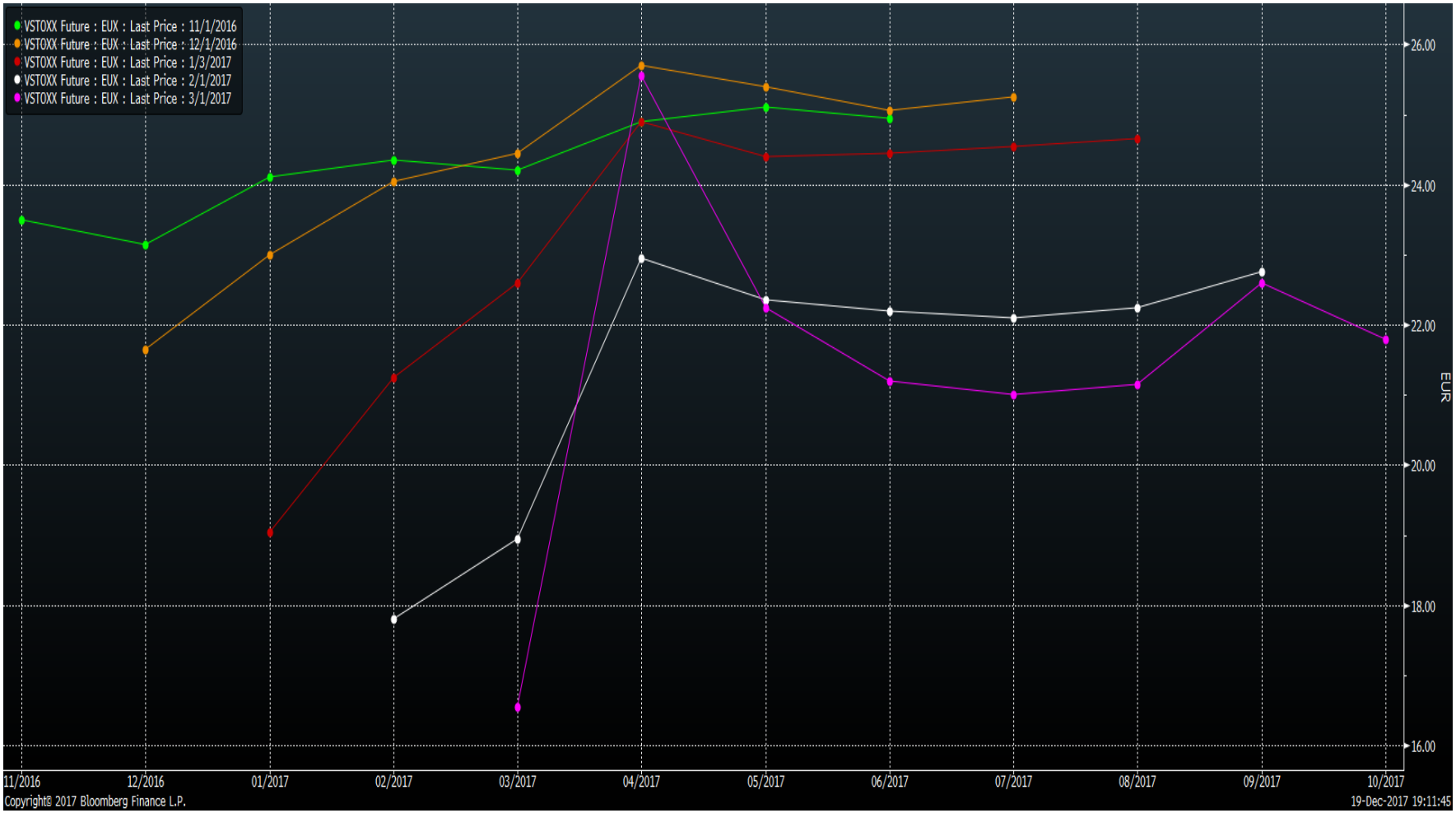
Source: Bloomberg data

VSTOXX® futures curves regarding 2017 French election (Feb 2017)



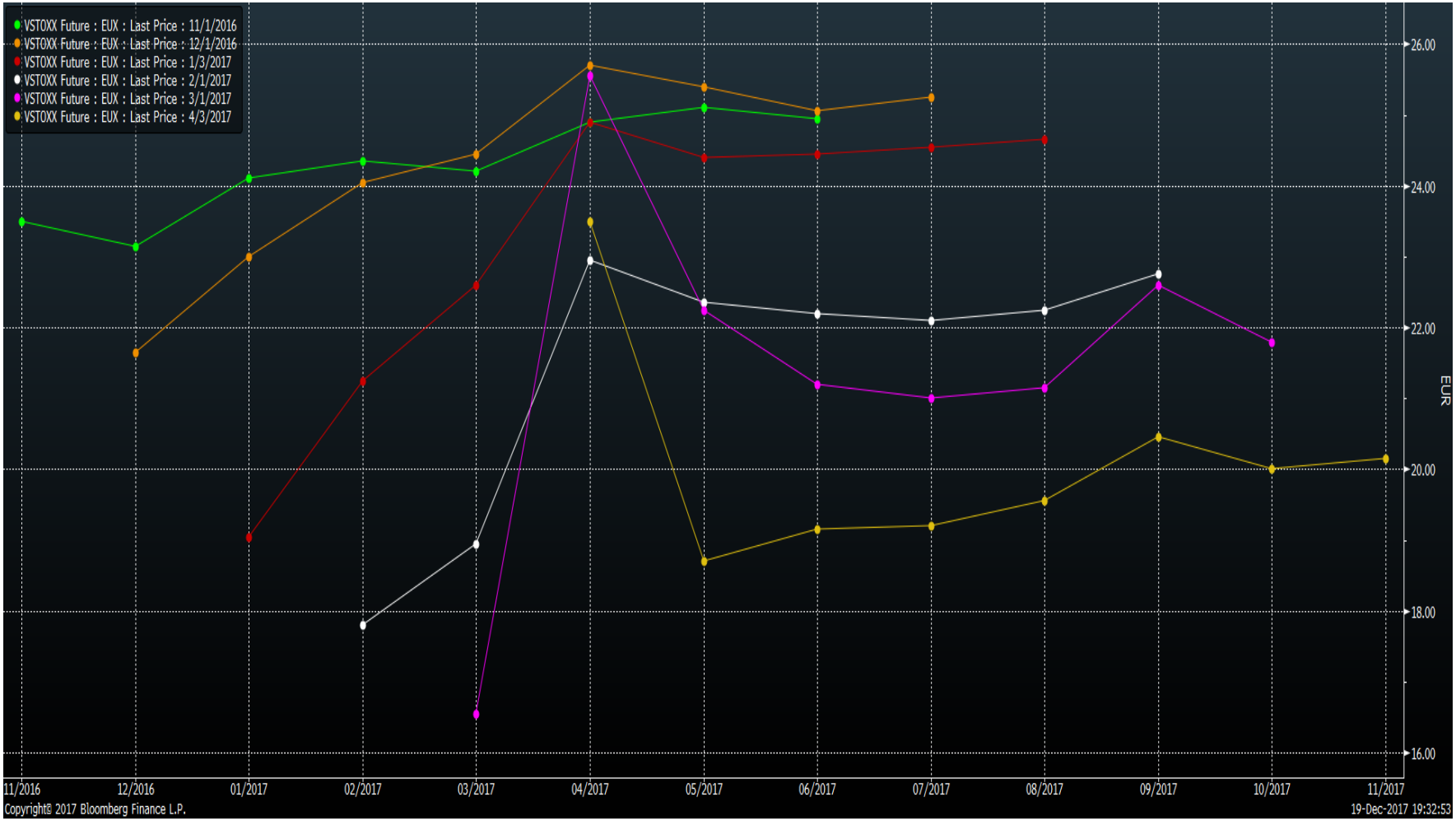
Source: Bloomberg data

VSTOXX® futures curves regarding 2017 French election (Mar 2017)



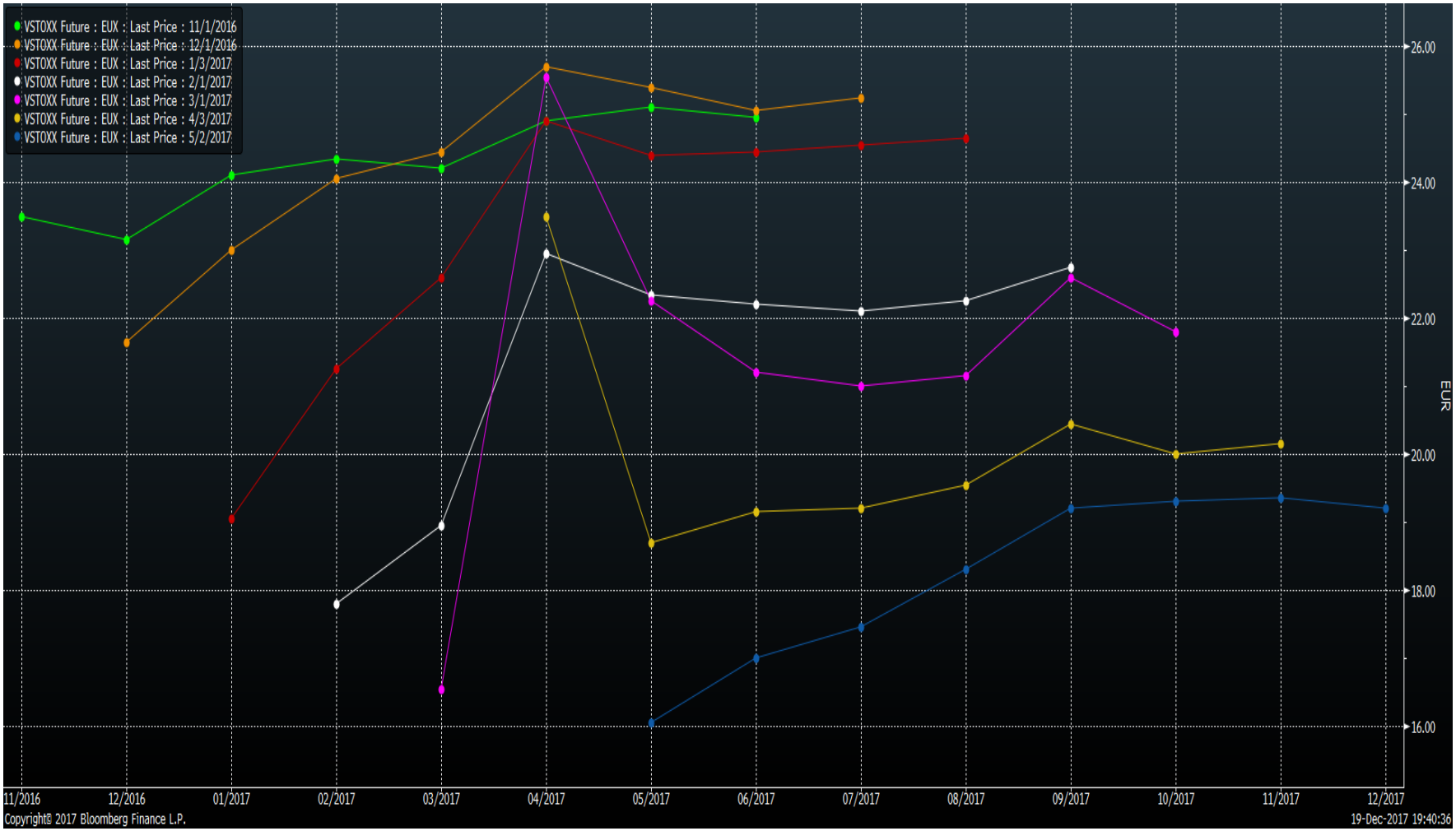
Source: Bloomberg data

VSTOXX® futures curves regarding 2017 French election (April 2017)



Source: Bloomberg data

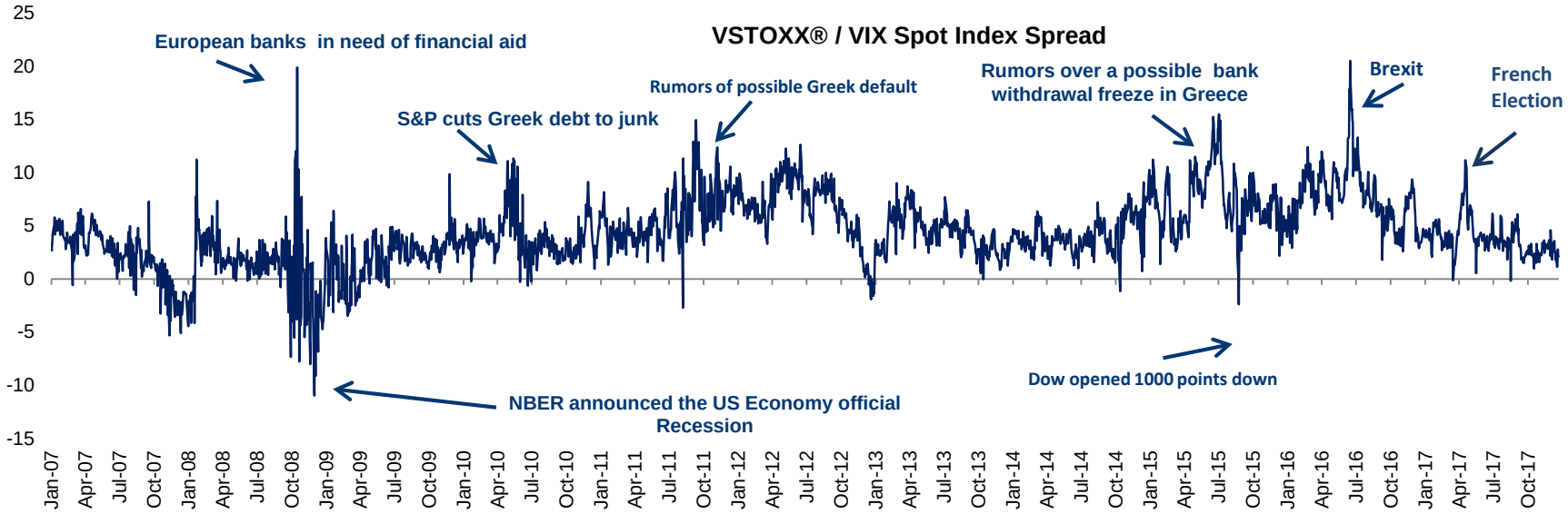
VSTOXX® futures curves regarding 2017 French election (May 2017)



Source: Bloomberg data

Spread price of VSTOXX® / VIX spot index spread 1 January 2009 to 22 December 2017

- VSTOXX®/VIX spread is volatile and mean-reverting, and is range bound over time.
- Since Jan 2007, the spread has averaged 4.4 points (VSTOXX® over the VIX).
- Since Jan 2014, the spread has averaged 5.3 points (VSTOXX® over the VIX).
  - In 2016 the average spread jumped to 8.02 points due to European-specific volatility.
  - Greek Crisis: In June 2015, the spread went to 13 due to the Greek Crisis then went below 1.0 in August 2015 when US equities tumbled.
  - In June 2016, the spread went over 20 due to the Brexit.
  - April 2017 the spread exceeded 11 due to the French election.



Source: "VSTOXX/ VIX volatility spread behavior during recent volatility events", M. Shore 2016

Potential ideas to think about regarding trading OVS2

- The term structure of VSTOXX® Futures is frequently in contango (spot price is less than futures prices)
- When volatility begins to show up in the VSTOXX® index, it tends to experience greater moves in the spot, front and nearby futures months:
- If the market is in contango and an expectation of a larger move in the front month vs back months:
  - buy calls in the front month and buy puts in the back months
  - sell puts in the front month to receive some premium and the expectation the front month may move higher
- If the market is expected to remain in contango:
  - buy puts in the back months as the price of the back months may decline as they move closer to expiration
- If the futures term structure is in backwardation for an extended period of time:
  - determine to either buy puts or sell calls in the front month or nearby month with the perspective of the VSTOXX® futures potentially moving lower

Source: “Introduction on CFTC – certified Options on VSTOXX® Futures” M. Shore 2017

For more information

- Go to: http://www.eurexchange.com/exchange-en/products/vol/vstoxx

  http://www.eurexgroup.com/group-en/newsroom/vstoxx-outlook

- Or to: http://www.shorecapmgmt.com/vstoxx-articles.html

Thank You