

DEUTSCHE BANK AKTIENGESELLSCHAFT

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ProVol({})

A Tactical Strategy for Implied Volatility September 30, 2014

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Context

- Systematic volatility strategies can underperform or carry significant risk
  
- Long volatility positions can be expensive over the long term -- carry costs may offset gains (see performance of SandP Short-Term VIX Futures Index(1) below)
  
- Short volatility positions can suffer sharp drawdowns, potentially eliminating accumulated gains (see performance of DB ImpAct(2) below)
  
- Entry and exit points are key, but getting those correct is very difficult

(1) The SandP Short-Term VIX Futures Index (the underlying index for VXX) aims to maintain a constant 1-month maturity exposure to VIX futures by rolling equal fractional amounts from the front month VIX future to the next month VIX future daily (2) DB ImpAct is a systematic short-volatility strategy that sells rolling one-month notional variance swaps on the monthly option expiry dates

Source: Deutsche Bank, Bloomberg Finance, L.P., 2014

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Volatility Allocation: Challenges

- Volatility allocation involves considerable challenges
- Which indicators of future volatility are meaningful?
- Implied volatility, realized volatility, term structure, skew?
- Many indicators are themselves highly volatile
- For instance, the annualized daily volatility of the VIX Index (1-month implied volatility) is frequently over 100
- Trading volatility products is costly
- Not all markets are liquid, particularly at longer maturities
- Bid-offer spreads can be large
- Carry costs are frequently high

Source: Deutsche Bank, Bloomberg Finance, L.P., 2014

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Volatility Allocation: Solutions

- Deutsche Bank has done substantial work examining a variety of volatility indicators, products and allocation methods
  - Implied versus realized vol
  - Shorter versus longer dated vol
  - Variance versus VIX-based products
  - Daily, weekly or monthly allocation
  - Deutsche Bank's ProVol(()) integrates solutions to these challenges
  - Meaningful indicators are combined to offset or reinforce each other
  - Allocation to volatility is calculated daily, but is recursive (the starting point is the prior day's allocation), managing trading cost
  - Weak signals result in no allocation, reducing cost and risk
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Building ProVol([])

-- ProVol goes long or short implied volatility based on a signal

-- Underlying investment is the Deutsche Bank Short-Term VIX Futures Index, which aims to hold a 1-month constant maturity position in VIX futures through a weighted position in first and second month futures

-- The ProVol Signal is built upon three fundamental volatility indicators

-- Volatility "Regime"

-- Deutsche Bank's Volatility Regime Model, which aims to capture momentum in realized volatility, is the principal indicator adopted

-- Level of Volatility

-- The level of implied volatility complements the Regime indicator by aiming to identify suitable entry and exit points

-- Volatility Term Structure

-- Volatility term structure steepness, a measure of the cost of carry, isolates the potential cost or benefit of holding a long or short volatility position

Volatility Regimes: What Are They?

-- The SandP 500 has exhibited periods of realized volatility that occur, and tend to remain, within a certain range or "regime"

-- Intuitively, we know them when we've seen them[]

-- 2004-2007 was a "low-vol" regime

-- 1998-2002 was a "higher-vol" regime

-- 2008 was an "extreme-vol" regime

-- []but seeing them coming is not so easy

-- Deutsche Bank's Volatility Regime Model analyzes SandP 500 realized volatility to estimate daily probabilities for being in each of three defined volatility regimes: Low, Medium and High

(See Appendix I for a complete discussion of the Volatility Regime Model)

Source: Deutsche Bank, Bloomberg Finance, L.P., 2014

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Volatility Regimes: What Can They Tell Us?

-- Our work with the Volatility Regime Model brought to light a couple counterintuitive points -- You don't necessarily need to capture the first spike in volatility -- Periods of high volatility generally do not occur overnight -- Increases in realized vol have frequently been a leading indicator for implied vol -- Buying vol "cheap" isn't cheap -- Periods of low volatility have been persistent -- The cost of holding a long volatility position, particularly when vol is low and term structure is generally steep, can be very expensive -- This knowledge can help us in building a signal that aims to capture returns from both high and low volatility markets -- We aim to avoid unnecessary long positions, and the cost associated with them, by waiting for volatility to start picking up before going long -- We aim to capture returns from being short volatility in low volatility periods

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Level of Implied Volatility

-- Level of Implied Volatility

-- The Regime Model has historically shown that buying vol at low levels is not generally a good idea and you can wait for vol to start rising before going long

-- However, it doesn't mean you should be long vol at any level even during a high volatility regime

-- Extreme levels of vol have historically not persisted for long

-- At very high levels there is likely to be more downside than upside and the risk may outweigh the potential benefit

-- Why 3-month Implied Vol?

-- VIX is a measure of 1-month volatility; the 1-month constant maturity holding of VIX futures, therefore, is a measure of 1-month forward 1-month volatility

-- This falls between VIX (1-month) and VXV (3-month)

-- 1-month implied vol is very noisy and may not be a good indicator of the market's view of volatility direction or true level

-- 3-month vol incorporates the market's view of 1-month and 2-month vol



Implied Volatility Term Structure

-- Implied Volatility Term Structure

-- The implied volatility term structure is generally upward sloping (longer dated vols higher than shorter dated vols)

[] 3-month vol (VXV) has been higher than 1 month vol (VIX) 80% of the time since 2002

-- Though this is often interpreted as an expectation of higher future volatility, this is not always the case, nor the only reason for it to be upward sloping

-- Volatility can only go down to zero, but can go infinitely high

-- Volatility sellers' risk is to the upside, so they charge a premium, even to expectations

-- In this scenario, if you hold a long volatility position for a month and the absolute level of volatility does not change, your position will lose value

-- You would need volatility to increase, sometimes substantially, simply to break even

-- Being short vol, if you think the probability of vol increasing is low, would be a better investment

Source: Deutsche Bank, Bloomberg Finance, L.P., 2014

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Strategy Construction: The Signal and Allocation

- The ProVol Signal is calculated based on the daily levels of the three indicators
  - High Vol Regime Probability
  - The Volatility Regime Model probability of being in a high-volatility regime
  - Higher probabilities increase the Signal (i.e., move it in a "long" direction)
  - Volatility Level
  - Level of 3-month implied volatility (VXV Index)
  - Higher levels decrease the Signal (i.e., move it in a "short" direction)
  - Volatility Term Structure
  - Ratio between 3-month and 1-month implied volatilities (VXV Index / VIX Index)
  - Higher ratios decrease the Signal (i.e., move it in a "short" direction)
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Strategy Construction: The Signal and Allocation (con't)

-- The contribution of each of the three indicators to the Signal is based on a fixed weight (Factor Coefficient) -- The prior day's Allocation is added to stabilize the Signal, make changes more gradual and reduce trading costs -- Those four variables (plus a constant) are combined to create the Signal

-- A "step-wise" function converts the signal into a daily Allocation

-- Weak Signals ( = +/- 0.1) result in zero Allocation

-- If not a Weak Signal, amount in excess of +/- 0.1 is multiplied by 1.5

-- The Allocation is capped/floored at +/- 0.3

-- See charts on next two pages for a graphical representation and example of the Signal and Allocation process

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Strategy Construction: An Example

\*The Prior Day's Allocation is multiplied by the recursion factor of 0.81 \*\*The Volatility Level is normalized by (divided by) 20

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Strategy Construction: The Indices

-- The ProVol Allocation is used to create three separate indices

-- The Deutsche Bank ProVol Balanced Index

-- Uses a balanced 1.5 x long or short Allocation weighting to create a strategy that aims to balance capturing returns from term-structure carry and volatility spikes

-- The Deutsche Bank ProVol Carry Index

-- Uses a 2 x short Allocation, 1 x long Allocation weighting to create a strategy that aims to capture enhanced returns from term-structure carry versus volatility spikes

-- The Deutsche Bank ProVol Hedge Index

-- Uses a 1 x short Allocation, 2 x long Allocation weighting to create a strategy that aims to capture enhanced returns from volatility spikes versus term-structure carry

-- Each index uses the same daily factors, Signal and resulting Allocation -- Each index takes a long or short position in the Deutsche Bank Short-Term VIX Futures Index

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ProVol Retrospective Historical Allocations

Note: The ProVol indices did not exist prior to September 24, 2012 (the "Live Date"). The ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before the Live Date. All results prior to the Live Date were retrospectively calculated. Accordingly, the results shown during the retrospective period are hypothetical and do not reflect actual returns. Past performance is not necessarily indicative of how an index will perform in the future. The performance of any investment product based on a ProVol Index would have been lower than the ProVol Index as a result of fees and/or costs. See Risk Factors for more information. Source: Deutsche Bank, Bloomberg Finance L.P., 2014

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ProVol([ ]) Balanced Retrospective Performance

BBG: DBVEPVB

Performance Analysis

Dec '05 - Sep '14

Annualized Returns 33.7% Volatility 17.6% Sharpe Ratio 1.9 Max. Drawdown  
 -19.1% Start Date May 21, 2010 End Date Sep 13, 2010 Monthly Returns %  
 Positive 45% % Negative 12% Average 2.6% Median 0.0% Rolling 3 Month Max/Min  
 80.5% / -9.8% Rolling 12 Month Max/Min 102.9% / -2.5%

Monthly Returns Analysis

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan	0.0%	0.0%	-4.0%	2.1%	1.5%	7.2%	12.8%	0.0%	0.0%
Feb	0.0%	-2.5%	-2.1%	0.6%	7.9%	0.9%	2.0%	0.0%	0.0%
Mar	0.0%	3.8%	-0.4%	2.1%	9.3%	6.7%	16.6%	0.0%	0.0%
Apr	0.0%	0.0%	-1.4%	-7.5%	4.5%	9.5%	-0.9%	0.0%	0.0%
May	0.0%	0.0%	0.0%	-1.4%	0.3%	-0.2%	-1.3%	0.0%	0.0%
Jun	0.0%	0.0%	-0.4%	6.0%	-14.0%	0.0%	13.0%	0.0%	0.0%
Jul	0.0%	0.0%	1.6%	3.5%	14.8%	0.0%	4.0%	0.0%	0.0%
Aug	0.0%	0.7%	2.4%	1.4%	0.4%	14.4%	6.8%	0.0%	0.0%
Sep	0.0%	9.2%	9.4%	7.1%	9.6%	4.0%	0.0%	0.0%	0.0%
Oct	0.0%	0.1%	45.0%	0.2%	12.4%	-2.2%	0.0%	0.0%	
Nov	0.0%	3.5%	13.8%	7.1%	1.0%	8.1%	0.0%	0.0%	
Dec	0.0%	2.5%	2.3%	7.5%	12.1%	3.3%	0.0%	0.0%	
Annual	0.0%	18.3%	76.1%	31.4%	73.6%	63.8%	64.4%	0.0%	0.0%

Note: The ProVol indices did not exist prior to September 24, 2012 (the "Live Date"). The ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before the Live Date. All results prior to the Live Date were retrospectively calculated. Accordingly, the results shown during the retrospective period are hypothetical and do not reflect actual returns. Past performance is not necessarily indicative of how an index will perform in the future. The performance of any investment product based on a ProVol Index would have been lower than the ProVol Index as a result of fees and/or costs. See Risk Factors for more information. Source: Deutsche Bank, Bloomberg Finance L.P., 2014





ProVol([ ]) Carry Retrospective Performance

BBG: DBVEPVC

Performance Analysis

	Dec '05 - Sep '14
Annualized Returns	39.2%
Volatility	19.0%
Sharpe Ratio	2.1
Max. Drawdown	-18.1%
Start Date	May 21, 2010
End Date	Aug 2, 2010

Monthly Returns

% Positive	45%
% Negative	12%
Average	3.0%
Median	0.0%
Rolling 3 Month Max/Min	48.9% / -10.1%
Rolling 12 Month Max/Min	154.7% / -1.6%

Monthly Returns Analysis

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan	0.0%	0.0%	-5.4%	2.3%	1.9%	9.6%	17.3%	0.0%	0.0%
Feb	0.0%	-1.6%	-2.9%	0.4%	10.6%	1.3%	2.4%	0.0%	0.0%
Mar	0.0%	2.5%	-0.5%	1.5%	12.5%	9.0%	22.3%	0.0%	0.0%
Apr	0.0%	0.0%	-0.5%	-5.0%	6.0%	12.8%	-1.2%	0.0%	0.0%
May	0.0%	0.0%	0.0%	0.2%	-0.6%	-0.2%	-1.9%	0.0%	0.0%
Jun	0.0%	0.0%	-0.6%	6.9%	-14.7%	0.0%	17.2%	0.0%	0.0%
Jul	0.0%	0.0%	2.0%	4.6%	20.1%	0.0%	5.1%	0.0%	0.0%
Aug	0.0%	0.9%	3.2%	1.8%	0.5%	9.7%	9.1%	0.0%	0.0%
Sep	0.0%	12.4%	6.2%	9.5%	13.0%	0.9%	0.0%	0.0%	0.0%

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Oct	0.0%	0.2%	28.4%	0.1%	16.7%	-1.3%	0.0%	0.0%
Nov	0.0%	4.7%	9.2%	9.4%	1.2%	6.3%	0.0%	0.0%
Dec	0.0%	3.3%	3.4%	10.1%	16.3%	4.8%	0.0%	0.0%
Annual	0.0%	23.9%	46.4%	49.2%	113.2%	65.6%	91.5%	0.0%

Note: The ProVol indices did not exist prior to September 24, 2012 (the "Live Date"). The ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before the Live Date. All results prior to the Live Date were retrospectively calculated. Accordingly, the results shown during the retrospective period are hypothetical and do not reflect actual returns. Past performance is not necessarily indicative of how an index will perform in the future. The performance of any investment product based on a ProVol Index would have been lower than the ProVol Index as a result of fees and/or costs. See Risk Factors for more information. Source: Deutsche Bank, Bloomberg Finance L.P., 2014

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ProVol({}) Hedge Retrospective Performance

BBG: DBVEPVH

Performance Analysis

	Dec '05 - Sep '14
Annualized Returns	27.8%
Volatility	18.1%
Sharpe Ratio	1.5
Max. Drawdown	-20.2%
Start Date	May 21, 2010
End Date	Oct 21, 2010

Monthly Returns

% Positive	45%
% Negative	12%
Average	2.3%
Median	0.0%
Rolling 3 Month Max/Min	117.8% / -10.3%
Rolling 12 Month Max/Min	131.6% / -3.3%

Monthly Returns Analysis

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan	0.0%	0.0%	-2.6%	1.9%	1.1%	4.8%	8.4%	0.0%	0.0%
Feb	0.0%	-3.3%	-1.4%	0.7%	5.3%	0.6%	1.4%	0.0%	0.0%
Mar	0.0%	5.1%	-0.4%	2.6%	6.1%	4.4%	10.9%	0.0%	0.0%
Apr	0.0%	0.0%	-2.4%	-9.9%	3.0%	6.2%	-0.6%	0.0%	0.0%
May	0.0%	0.0%	0.0%	-3.0%	1.2%	-0.1%	-0.8%	0.0%	0.0%
Jun	0.0%	0.0%	-0.3%	4.9%	-13.4%	0.0%	8.7%	0.0%	0.0%
Jul	0.0%	0.0%	1.1%	2.3%	9.7%	0.0%	2.7%	0.0%	0.0%
Aug	0.0%	0.5%	1.6%	0.9%	0.3%	18.9%	4.5%	0.0%	0.0%
Sep	0.0%	6.1%	12.5%	4.7%	6.4%	7.0%	0.0%	0.0%	0.0%

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Oct	0.0%	0.1%	63.3%	0.2%	8.1%	-3.3%	0.0%	0.0%
Nov	0.0%	2.4%	18.5%	4.7%	0.8%	9.7%	0.0%	0.0%
Dec	0.0%	1.7%	1.1%	5.0%	8.0%	1.8%	0.0%	0.0%
Annual	0.0%	12.8%	110.6%	15.0%	40.4%	60.7%	40.3%	0.0%

Note: The ProVol indices did not exist prior to September 24, 2012 (the "Live Date"). The ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before the Live Date. All results prior to the Live Date were retrospectively calculated. Accordingly, the results shown during the retrospective period are hypothetical and do not reflect actual returns. Past performance is not necessarily indicative of how an index will perform in the future. The performance of any investment product based on a ProVol Index would have been lower than the ProVol Index as a result of fees and/or costs. See Risk Factors for more information. Source: Deutsche Bank, Bloomberg Finance L.P., 2014

ProVol( ) Comparative Retrospective Performance

Performance Analysis

	Dec '05 - Sep '14		Sep '06 - Sep '14
	ProVol Balanced	SandP Dyn VIX	JPM Str Vol
Annualized Returns	33.7%	9.3%	14.4%
Volatility	18.2%	23.2%	30.6%
Sharpe Ratio	1.9	0.4	0.5
Max. Drawdown	-19.1%	-53.0%	-49.2%
Start Date	May 21, 2010	Oct 4, 2011	Oct 4, 2011
End Date	Sep 13, 2010	Jun 30, 2014	Jun 30, 2014
Monthly Returns			
% Positive	45%	44%	51%
% Negative	12%	51%	44%
Average	2.6%	1.1%	1.7%
Median	0.0%	-0.3%	0.5%
Rolling 3 Month Max/Min	80.5% / -9.8%	129.3% / -15.3%	119.2% / -31.5%
Rolling 12 Month Max/Min	102.9% / -2.5%	145.8% / -30.2%	188.4% / -36.8%

"SandP Dyn VIX" is the SandP Dynamic VIX Futures ER Index (BBG: SPDVIXP), which is an excess return version of the underlying index for Barclay's XVZ iPath ETN

"JPM Str Vol" is the JP Morgan Strategic Volatility Index (BBG: JPUSSTVL)

(1)The JPM Str Vol index level has been rebased to the ProVol Balanced index level as of September 19, 2006, the first date on which data is available for JPM Str Vol Index.

Note: The ProVol indices did not exist prior to September 24, 2012 (the "Live Date"). The ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before the Live Date. All results prior to the Live Date were retrospectively calculated. Accordingly, the results shown during the retrospective period are hypothetical and do not reflect actual returns. Past performance is not necessarily indicative of how an index will perform in the future. The performance of any investment product based on a ProVol Index would have been lower than the ProVol Index as a result of fees and/or costs. See Risk Factors for more information. Source: Deutsche Bank, Bloomberg Finance L.P., 2014

ProVol(()) as an Overlay to an SandP 500 Portfolio

Performance Analysis

	Dec '05 - Sep '14		
	ProVol Balanced	SandP 500 TR	SandP + ProVol
Annualized Returns	33.8%	7.6%	17.8%
Volatility	18.0%	21.5%	19.9%
Sharpe Ratio	1.9	0.4	0.9
Max. Drawdown	-19.1%	-55.3%	-39.9%
Start Date	May 21, 2010	Oct 10, 2007	Oct 10, 2007
End Date	Sep 13, 2010	Apr 2, 2012	Oct 14, 2009

Monthly Returns

% Positive	45%	64%	66%
% Negative	12%	32%	30%
Average	2.6%	0.7%	1.4%
Median	0.0%	1.3%	1.6%
Rolling 3 Month Max/Min	80.5% / -9.8%	25.8% / -29.6%	23.3% / -16.0%
Rolling 12 Month Max/Min	102.9% / -2.5%	53.6% / -43.3%	65.2% / -24.5%

"SandP + ProVol" represents a \$100 levered investment with a 100% weight in SandP 500 TR and a 25% weight in ProVol Balanced, starting on December 30, 2005 and rebalanced annually to a 100% weight in SandP 500 TR and a 25% weight in ProVol Balanced.

Note: The ProVol indices did not exist prior to September 24, 2012 (the "Live Date"). The ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before the Live Date. All results prior to the Live Date were retrospectively calculated. Accordingly, the results shown during the retrospective period are hypothetical and do not reflect actual returns. Past performance is not necessarily indicative of how an index will perform in the future. The performance of any investment product based on a ProVol Index would have been lower than the ProVol Index as a result of fees and/or costs. See Risk Factors for more information. Source: Deutsche Bank, Bloomberg Finance L.P., 2014

ProVol( ) as an Overlay to an MSCI World Portfolio

Performance Analysis

	Dec '05 - Sep '14		
	ProVol Balanced	MSCI World	MSCI + ProVol
Annualized Returns	33.8%	3.5%	13.7%
Volatility	18.0%	18.6%	17.4%
Sharpe Ratio	1.9	0.2	0.8
Max. Drawdown	-19.1%	-59.1%	-44.1%
Start Date	May 21, 2010	Nov 1, 2007	Nov 1, 2007
End Date	Sep 13, 2010	Mar 6, 2014	Dec 28, 2009
Monthly Returns			
% Positive	45%	53%	59%
% Negative	12%	43%	37%
Average	2.6%	0.4%	1.2%
Median	0.0%	1.0%	1.1%
Rolling 3 Month Max/Min	80.5% / -9.8%	29.2% / -33.6%	26.6% / -15.4%
Rolling 12 Month Max/Min	102.9% / -2.5%	50.9% / -48.4%	63.3% / -30.1%

"MSCI World" is the MSCI World Index (BBG ticker: MXWO)

"MSCI + ProVol" represents a \$100 levered investment with a 100% weight in MSCI World and a 25% weight in ProVol Balanced, starting on December 30, 2005 and rebalanced annually to a 100% weight in MSCI World and a 25% weight in ProVol Balanced.

Note: The ProVol indices did not exist prior to September 24, 2012 (the "Live Date"). The ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before the Live Date. All results prior to the Live Date were retrospectively calculated. Accordingly, the results shown during the retrospective period are hypothetical and do not reflect actual returns. Past performance is not necessarily indicative of how an index will perform in the future. The performance of any investment product based on a ProVol Index would have been lower than the ProVol Index as a result of fees and/or costs. See Risk Factors for more information. Source: Deutsche Bank, Bloomberg Finance L.P., 2014



## Alternative Products Comparison: Monthly Returns

ProVol Balanced Index									
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan	0.0%	0.0%	-4.0%	2.1%	1.5%	7.2%	12.8%	0.0%	0.0%
Feb	0.0%	-2.5%	-2.1%	0.6%	7.9%	0.9%	2.0%	0.0%	0.0%
Mar	0.0%	3.8%	-0.4%	2.1%	9.3%	6.7%	16.6%	0.0%	0.0%
Apr	0.0%	0.0%	-1.4%	-7.5%	4.5%	9.5%	-0.9%	0.0%	0.0%
May	0.0%	0.0%	0.0%	-1.4%	0.3%	-0.2%	-1.3%	0.0%	0.0%
Jun	0.0%	0.0%	-0.4%	6.0%	-14.0%	0.0%	13.0%	0.0%	0.0%
Jul	0.0%	0.0%	1.6%	3.5%	14.8%	0.0%	4.0%	0.0%	0.0%
Aug	0.0%	0.7%	2.4%	1.4%	0.4%	14.4%	6.8%	0.0%	0.0%
Sep	0.0%	9.2%	9.4%	7.1%	9.6%	4.0%	0.0%	0.0%	0.0%
Oct	0.0%	0.1%	45.0%	0.2%	12.4%	-2.2%	0.0%	0.0%	0.0%
Nov	0.0%	3.5%	13.8%	7.1%	1.0%	8.1%	0.0%	0.0%	0.0%
Dec	0.0%	2.5%	2.3%	7.5%	12.1%	3.3%	0.0%	0.0%	0.0%
Annual	0.0%	18.3%	76.1%	31.4%	73.6%	63.8%	64.4%	0.0%	0.0%

SandP Short-Term VIX Futures Index (VXX)									
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan	-11.3%	-14.0%	7.2%	6.6%	-5.7%	-14.3%	-24.8%	-22.9%	17.3%
Feb	-8.1%	5.4%	3.3%	5.4%	-18.1%	-6.3%	-7.9%	0.7%	-13.1%
Mar	-6.1%	6.9%	0.5%	4.3%	-19.1%	-1.9%	-32.6%	-17.2%	-2.4%
Apr	-3.9%	-10.2%	-20.3%	-17.5%	0.3%	-21.5%	-1.1%	-6.0%	-4.8%
May	27.8%	-2.4%	-14.3%	-18.3%	38.0%	-8.3%	28.7%	2.6%	-16.4%
Jun	-8.9%	14.0%	14.3%	-10.8%	7.9%	-0.9%	-29.1%	7.3%	-15.0%
Jul	1.3%	24.8%	-3.1%	-9.0%	-28.2%	11.6%	-9.2%	-27.8%	12.7%
Aug	-14.6%	19.5%	-7.1%	-4.5%	-3.4%	66.2%	-15.5%	13.3%	-11.8%
Sep	-8.5%	-15.7%	36.4%	-15.9%	-20.2%	38.8%	-22.7%	-13.0%	10.6%
Oct	-23.4%	-2.2%	117.1%	-3.1%	-24.4%	-24.2%	5.5%	-12.7%	
Nov	-6.3%	23.6%	16.7%	-16.0%	-5.6%	2.0%	-21.9%	-11.6%	
Dec	-3.7%	-7.1%	-17.6%	-16.3%	-24.1%	-13.9%	7.0%	-6.0%	
Annual	-53.2%	36.6%	123.1%	-65.0%	-72.0%	-3.8%	-77.9%	-65.7%	-26.2%

SandP Dynamic VIX Futures Index (XVZ)									
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan	-1.1%	-2.9%	-0.4%	0.1%	-1.7%	-5.8%	1.3%	-9.4%	-0.1%
Feb	-2.0%	-5.5%	1.9%	3.2%	-1.5%	-3.9%	3.0%	-3.4%	-5.4%
Mar	-5.4%	-4.0%	-1.7%	1.2%	3.0%	-4.9%	-2.1%	1.5%	-2.3%
Apr	0.0%	0.6%	-4.9%	-2.6%	4.4%	2.2%	-2.2%	-5.2%	-2.1%
May	11.4%	3.0%	4.1%	-8.2%	10.8%	-2.3%	2.3%	3.5%	1.2%
Jun	-3.1%	3.8%	-0.6%	-0.3%	2.7%	-1.2%	-0.6%	6.2%	-3.3%
Jul	-2.8%	18.7%	-5.1%	3.8%	-3.0%	-6.0%	-2.9%	-6.0%	0.0%
Aug	3.2%	6.0%	2.4%	2.6%	7.4%	38.8%	1.5%	0.4%	0.6%
Sep	3.3%	-7.5%	14.3%	-0.4%	1.6%	9.6%	-6.0%	-3.9%	2.9%
Oct	-3.0%	5.5%	77.5%	0.9%	-2.2%	-12.0%	-5.4%	-6.9%	

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Nov	-2.7%	11.3%	13.0%	2.7%	0.0%	3.6%	-3.9%	-0.6%
Dec	2.0%	1.3%	4.6%	-1.9%	-1.8%	-1.8%	-2.8%	-5.6%
Annual	-1.2%	31.1%	128.8%	0.6%	20.5%	8.8%	-16.7%	-16.0%

JP Morgan Strategic Volatility Index

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan		2.5%	-5.4%	-3.5%	-0.2%	-1.7%	5.4%	0.0%	-6.3%
Feb		-7.5%	1.4%	10.2%	4.4%	-0.5%	6.3%	-4.1%	-16.9%
Mar		-8.5%	-3.5%	4.3%	6.1%	-6.1%	5.5%	7.0%	-2.1%
Apr		3.3%	3.7%	-1.0%	-0.5%	6.3%	-1.2%	-4.7%	0.2%
May		2.7%	10.4%	3.1%	1.0%	1.1%	-5.9%	1.3%	8.2%
Jun		-4.1%	-8.2%	4.6%	-11.5%	-4.1%	7.3%	-3.3%	-1.4%
Jul		3.8%	-9.7%	7.7%	10.2%	-10.2%	-2.4%	5.4%	-5.6%
Aug		11.9%	5.4%	4.1%	8.0%	34.0%	5.7%	-4.4%	0.2%
Sep		-8.0%	4.3%	7.1%	7.5%	23.4%	-0.9%	0.7%	-2.5%
Oct	-1.2%	5.2%	75.8%	-1.5%	6.0%	-20.1%	-5.6%	0.3%	
Nov	0.9%	-6.2%	19.6%	9.0%	-2.2%	2.7%	3.1%	-0.9%	
Dec	2.5%	5.1%	-3.6%	6.2%	1.6%	-2.8%	-7.8%	-12.0%	
Annual	N/A	-2.3%	95.5%	62.4%	32.5%	11.9%	8.3%	-15.0%	-25.0%

Note: The ProVol indices did not exist prior to September 24, 2012 (the "Live Date"). The ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before the Live Date. All results prior to the Live Date were retrospectively calculated. Accordingly, the results shown during the retrospective period are hypothetical and do not reflect actual returns. Past performance is not necessarily indicative of how an index will perform in the future. The performance of any investment product based on a ProVol Index would have been lower than the ProVol Index as a result of fees and/or costs. See Risk Factors for more information. Source: Deutsche Bank, Bloomberg Finance L.P., 2014

Index Costs

The calculation of the ProVol indices incorporates a daily deduction of costs meant to approximate the transaction costs associated with trading, or hedging, the indices' notional position in first and second month VIX futures.

The cost calculation takes into account changes in the notional VIX futures position associated with both the daily roll from the first month to the second month VIX future as well as any changes in position in relation to the Allocation. Each portion of the cost is calculated as both a fixed amount of the number of contracts notionally traded by the index as well as a percentage amount of the dollar value of the contracts notionally traded by the index. The greater of the two in each case is taken as the cost, with the fixed amount acting as a minimum.

The daily roll portion of the cost is calculated in two ways: 1) 0.1 times the total number of contracts bought and sold in conjunction with rolling from the first month VIX future to the second month VIX future, irrespective of any changes to the Allocation, divided by two; or 2) 0.35% times the total dollar value of the contracts bought and sold in conjunction with rolling from the first month VIX future to the second month VIX future, irrespective of any changes to the Allocation. The greater of the two is taken as the daily roll cost.

The allocation portion of the cost is calculated in two ways: 1) 0.1 times the total number of contracts bought and sold in conjunction with increasing or decreasing the index's holding of VIX futures in relation to the Allocation, irrespective of any changes due to the daily roll; or 2) 0.35% times the total dollar value of the contracts bought and sold in conjunction with increasing or decreasing the index's holding of VIX futures in relation to the Allocation, irrespective of any changes due to the daily roll. The greater of the two is taken as the allocation cost.

The daily roll cost and the allocation cost are added together to determine the daily total trading cost.

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Risk Factors

THE PROVOL INDICES ARE SUBJECT TO STRATEGY RISK -- The strategy of the ProVol Indices is to generate returns from the expected volatility of the SandP 500 Index by dynamically adjusting a long or short position in the VIX Futures Index based on the size and direction of the Signal and the resulting Allocation based on that Signal. The Signal aims to determine the likely short-term direction of implied volatility and the level of carrying costs.

However, the Signal may not be predictive of the short-term direction of implied volatility and/or the level of carrying costs. The methodology for determining the Signal is based on limited past data and that may not be predictive of future implied volatility. If the Signal is not successful in determining the likely short-term direction of implied volatility and/or the level of carrying costs, then the resulting Allocation based on that Signal may result in a notional long or short position in the VIX Futures Index that declines in value and causes the levels of the ProVol Indices to decrease.

THE PROVOL INDICES CONTAIN EMBEDDED COSTS -- In calculating the level of the ProVol Indices, the Index Sponsor will deduct the Index Fee. The Index Fee takes into account changes in the notional VIX futures contracts position measured by each ProVol Index associated both with the daily rolling from the first month to the second month VIX futures contracts underlying the VIX Futures Index as well as with any changes in the size of the notional position in the VIX Futures Index. Thus, large or more frequent shifts in the Signal or greater or more frequent changes in VIX futures contracts prices will require greater reallocation and will result in higher costs. Additionally, lower VIX futures contracts prices, which require a greater number of contracts to be notionally traded in order to achieve the same value, will also result in higher costs. We expect the Index Fee to average between 1.5bps and 2bps (0.015% and 0.02%) per trading day. However, the actual Index Fee may be substantially higher on days when there is a substantial change in the Allocation or prices of the VIX futures contracts, resulting in a substantial number or value of VIX futures contracts notionally traded. As of December 31, 2013, the annual Index Fees for the ProVol Indices, including retroactively calculated Index Fees from and including 2006 to and including September 24, 2012, have ranged from 0.00% to 7.12% .

THE PROVOL INDICES HAVE VERY LIMITED PERFORMANCE HISTORY -- Calculation of the ProVol Indices began on September 24, 2012. Therefore, the ProVol Indices have very limited performance history and no actual investment which allowed tracking of the performance of the ProVol Indices was possible before that date. The index performance data prior to this date shown in this presentation have been retrospectively calculated using historical data and the same methodology as described above since December 20, 2005. Although the Index Sponsor believes that these retrospective calculations represent accurately and fairly how the Index would have performed before September 24, 2012, the ProVol Indices did not, in fact, exist before September 24, 2012. Furthermore, the index methodologies of the ProVol Indices were designed, constructed and tested using historical market data and based on knowledge of factors that may have possibly affected their performance. The returns prior to September 24, 2012 were achieved by means of a retroactive application of such back-tested index methodologies designed with the benefit of hindsight. All prospective investors should be aware that no actual investment that allowed a tracking of the performance of the ProVol Indices was possible at any time prior to September 24, 2012. Furthermore, it is impossible to predict whether the ProVol Indices will rise or fall. The actual performance of the ProVol Indices may bear little relation to the retrospectively calculated performance of the ProVol Indices.



Risk Factors

DEUTSCHE BANK AG, LONDON BRANCH, AS THE SPONSOR OF THE PROVOL INDICES, MAY ADJUST EACH INDEX IN A WAY THAT AFFECTS ITS LEVEL AND MAY HAVE CONFLICTS OF INTEREST -- Deutsche Bank AG, London Branch is the sponsor of the ProVol Indices (the "Index Sponsor") and will determine whether there has been a market disruption event with respect to the ProVol Indices. In the event of any such market disruption event, the Index Sponsor may use an alternate method to calculate the closing level of the ProVol Indices. The Index Sponsor carries out calculations necessary to promulgate the ProVol Indices and maintains some discretion as to how such calculations are made. In particular, the Index Sponsor has discretion in selecting among methods of how to calculate the ProVol Indices in the event the regular means of determining the ProVol Indices are unavailable at the time a determination is scheduled to take place. There can be no assurance that any determinations made by the Index Sponsor in these various capacities will not affect the value of the levels of the ProVol Indices. Any of these actions could adversely affect the value of securities or options linked to the ProVol Indices. The Index Sponsor has no obligation to consider the interests of holders of securities linked to the ProVol Indices in calculating or revising the ProVol Indices.

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In this document, various performance-related statistics, such as index return and volatility, among others, of the ProVol indices are compared with those of the SandP Dynamic VIX Index, the SandP Short-Term VIX Futures Index, the JP Morgan Strategic Volatility Index, the SandP 500([R]) Index and the MSCI World Index. Such comparisons are for information purposes only. No assurance can be given that any ProVol index will outperform the SandP Dynamic VIX Index, the SandP Short-Term VIX Futures Index, the JP Morgan Strategic Volatility Index, the SandP 500([R]) Index and the MSCI World Index in the future; nor can assurance be given that ProVol will not significantly underperform the SandP Dynamic VIX Index, the SandP Short-Term VIX Futures Index, the JP Morgan Strategic Volatility Index, the SandP 500([R]) Index and the MSCI World Index in the future.

Similarly, no assurance can be given that the relative volatility levels of ProVol and the SandP Dynamic VIX Index, the SandP Short-Term VIX Futures Index, the JP Morgan Strategic Volatility Index, the SandP 500([R]) Index and the MSCI World Index will remain the same in the future.

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Appendix I

Volatility Regimes

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Volatility Regimes: How Do We Know?

- Using a single volatility metric would have done a poor job of predicting regime transitions or differentiating between volatility spikes and regime changes
  - Example: recent points in time when SandP 500 3-month realized vol was 13%
  - May 2005: Have we left the low-vol regime following the GM credit crisis?
  - July 2007: Have we left the low-vol regime of the mid-2000s?
  - June 2011: Have we switched back to a low-vol regime following the financial crisis?
  - Getting any one of these wrong could have had serious consequences
  - We need a framework which can suggest answers to the following questions:
    - What is the probability of being in a given regime currently?
    - What was the probability of being in a given regime at a historical point leading up to or following an event?
    - What is the probability that a series of observed returns was produced by a given regime?
-

Volatility Regime Model: Assumptions

-- Regime Model Assumptions

-- Three possible equity return distributions

-- Low, medium and high volatility regimes

-- We can move from one regime to another with a certain probability

-- Defined by a transition matrix

-- Each regime's mean daily return and volatility and overall probability of occurrence, along with the transition matrix, are fixed through time

-- We make no assumptions about what any of the values will be -- we let the data tell us -- but we may have certain expectations

-- Predominantly low or medium vol with shorter periods of high vol

-- Regimes are "sticky" -- likely to be persistent

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Volatility Regime Model: Results

-- Calibration produces the model that would have generated the historical returns with the highest likelihood (a "maximum likelihood estimation")

Regime	Regime-specific Annualized Volatility(1)	Long-term Regime Probability(1)
Low-Volatility:	9.4%	47%
Medium-Volatility:	18.1%	46%
High-Volatility:	44.4%	7%

-- Though we did not specify anything about them ahead of time, the calibration has identified regime-specific volatilities and probabilities that make sense intuitively

(1) These numbers have been rounded for ease of presentation

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Volatility Regime Model: Transition Matrix

-- The model determines that regimes have been sticky: once you are in a regime, you are much more likely to stay in a regime

Daily Likelihood of Transitioning Between Regimes (1)	Low-Vol	Medium-Vol	High-Vol
FROM: Low-Vol:	98.5%	1.5%	~0.0%
Medium-Vol:	1.5%	97.9%	0.6%
High-Vol:	~0.0%	3.9%	96.1%

-- Again, though we did not specify anything ahead of time, the transition matrix makes sense

-- For instance, the probability of jumping directly from the low-vol regime to the high-vol regime over night, or vice versa, is near zero

(1) These numbers have been rounded for ease of presentation

Volatility Regime Model: Test Case Outcomes

- So would the regime model have helped in our examples?
- May 31, 2005: the probability that we are still in the low vol regime was 93%
- Right call given the bull market lasts for 2 more years following the GM credit crisis
- July 31, 2007: the probability that we were still in the low-vol regime was 1%
- Right call given the impending credit crunch
- June 30, 2011: the probability that we had moved to the low-vol regime was only 7%
- Right call given what happens in July and August 2011
- So when might the regime model not be helpful or of informative value?
- Non-financial events like 9/11
- Market events like the "flash crash" of 2010, widely believed to be caused by computer trading systems, that may not be preceded by an increase in volatility [] In both cases the regime model showed a high probability of being in a medium vol regime prior to the event, but a low probability of being in a high vol regime