ETF Options Watch

Yielding higher with High Yield options

Asset Allocation

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Global

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A deep dive on HYG ETF options

High yield (HY) ETFs have witnessed explosive growth since the 2008 credit crisis owing to (i) an ultra-low interest rate environment that has starved the market for yield, (ii) a regulatory-induced drop in bond market liquidity, and (iii) the greater transparency, intraday tradability, accessibility, and single-trade diversification generally afforded by ETFs.

Indeed, since the start of the bull market in 2009 AUM in HYG and JNK (the top two HY ETFs by AUM) has increased six fold to more than $30bn. Crucially, HYG+JNK trading volumes now account for 12% of the total HY market, with a notional of $1.5bn changing hands on a daily basis. This in turn has stimulated impressive growth in HY ETF option liquidity, with notional option volume on HYG having more than tripled in the last three years to $700mn daily.

On top of delving into liquidity aspects of fixed income ETFs, in this note we explain the core drivers of risk in HYG (e.g., equity, credit, rates, and oil) and HYG options (e.g., credit volatility, interest rate volatility, and credit//rates correlation) and we have also developed a quantitative framework for identifying efficient HY credit hedges.

Top tactical recommendations:

Hedge a coordinated bond/equity sell-off via long HYG Dec17 88 puts for 1.3% or 88/84 put spreads for 0.9% (ref. 88.8): HYG sensitivity to both rates and equities makes it an ideal candidate to hedge a simultaneous sell-off in the two asset classes à la Taper tantrum in May-13, in light of high valuations, Fed balance sheet reduction and uncertainty over a change in leadership. With short dated vol on HYG on its 10yr floors and put skew rarely trading as expensive, we consider HYG put spreads attractive from a number of angles.

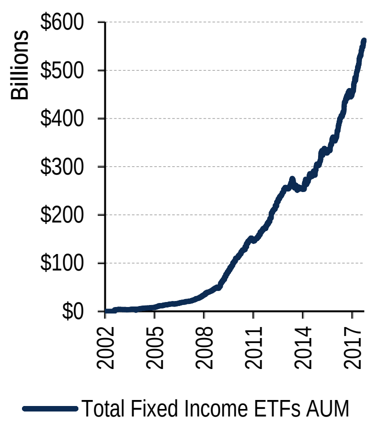
Hedge a flight-to-bonds risk-off event via long 0.4x IWM Dec17 139 put (ref. 148.2) and short 1x HYG 85 put (ref. 88.8) for zero cost: Small cap equities remain mired in a low vol regime with Russell2000 realizing the least vol in 20-years. This has contributed to compress the IWM-HYG implied vol spread to its lowest level over the past year. Notably, in a risk-off event where investors flock into perceived safe-haven bonds, any sell-off in HYG is likely to be partly offset due to the diversification benefits stemming from its rates exposure. Hence, in such a scenario we prefer owning IWM puts against HYG puts, a strategy that at current pricing has offered a highly asymmetric risk-reward.

Chase year-end HY upside while capping downside risk via long HYG Dec17 89 calls for 0.3% (ref. 88.8): Investors that have lagged their HY benchmark YTD, or would like to de-risk their portfolio but have fear of missing out on a potential year-end rally, may opt to go long HYG calls to lever ultra-depressed volatility. Implied vol on HYG is half as high as on SPY in spite of credit spreads going nowhere this year. In addition, HYG upside vol screens the cheapest among ETFs that have a high beta to risk assets.

1. Revisiting HY ETF delta-1 liquidity

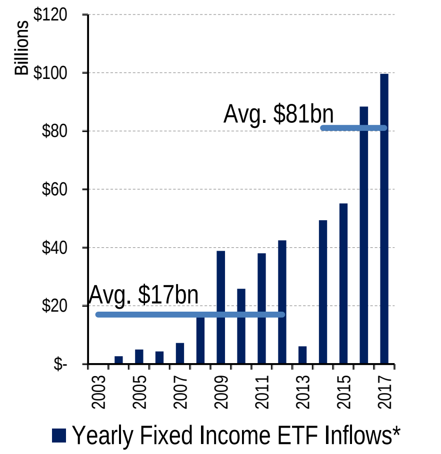
During the years following the GFC crisis, fixed income (FI) ETFs have grown exponentially, with assets under management now totaling $562 billion (Chart 1) from virtually zero in 2002, when they were first launched (approx. 10 years after equity ETFs). Notably, this trend does not show signs of abatement, with inflows into FI ETFs accelerating in the last three years, having more than doubled since Dec-14 from $49 billion to $100 billion (Chart 2). Growth in high yield (HY) ETFs has followed suit, with HYG and JNK (the largest by AUM) now having combined AUM north of $30 billion, and ranking as the 7th and 11th largest ETFs in the FI ETFs complex (Chart 3).

Chart 1: AUM in FI ETFs has grown exponentially post GFC and now totals $562bn



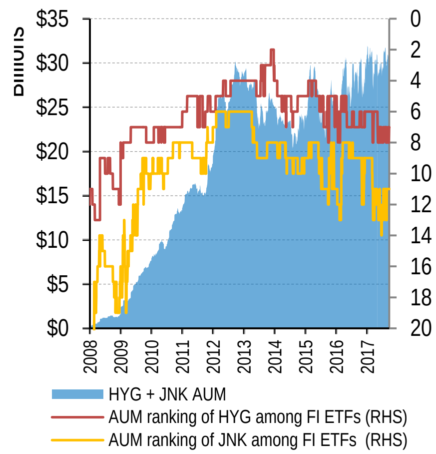
Source: BofA Merrill Lynch Global Research. Daily data from 1-Jan-02 to 20-Sep-17.

Chart 2: FI ETF inflows point to an acceleration in AUM over the past three years



Source: BofA Merrill Lynch Global Research. Yearly data from 31-Dec-03 to 20-Sep-17. *Inflows = [shares outstanding (t) - shares outstanding (t-1)]*NAV (t).

Chart 3: HY ETFs are among the largest in terms of AUM within the FI ETF complex



Source: BofA Merrill Lynch Global Research. Daily data from 1-Jan-02 to 20-Sep-17.

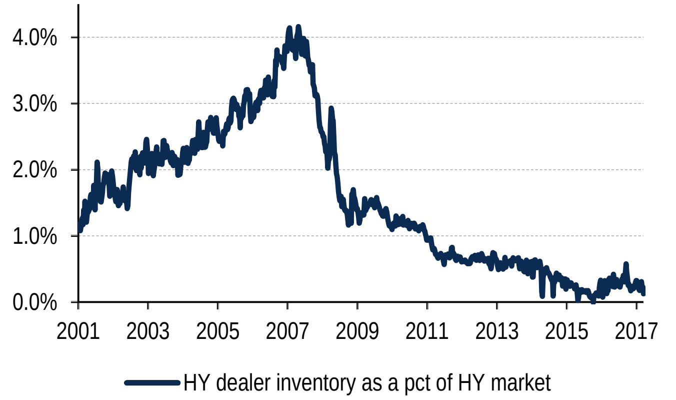
Reduced bond market liquidity post GFC helps explain success of HY ETFs

The explosive growth of HY ETFs – and FI ETFs in general – is attributable to a variety of different reasons, including the broad-based growing popularity of ETFs as investment vehicles (in the context of greater transparency, intraday tradability, accessibility and single-trade diversification), as well as the ultra-low interest rate environment that has pushed investors further out the risk spectrum in their quest for higher yield. However, perhaps the single most mentioned driver behind the success of HY ETFs is their increasing use as liquidity enhancement tools.

Indeed, there is anecdotal evidence that institutional investors commonly deploy them to create liquidity sleeves designed to enhance overall portfolio liquidity. This function has become increasingly important given the reduced liquidity in bond markets post crisis. Specifically, after the financial crisis, stricter regulations have forced many fixed-income dealers and other liquidity providers to reduce their traditional role as markets makers as they slashed inventories and cut back on the amount of capital devoted to providing liquidity. For instance, Chart 4 shows that at its peak HY dealer inventory accounted for as much as 4% of the total HY market pre crisis, while it's now less than a quarter of a percentage point.

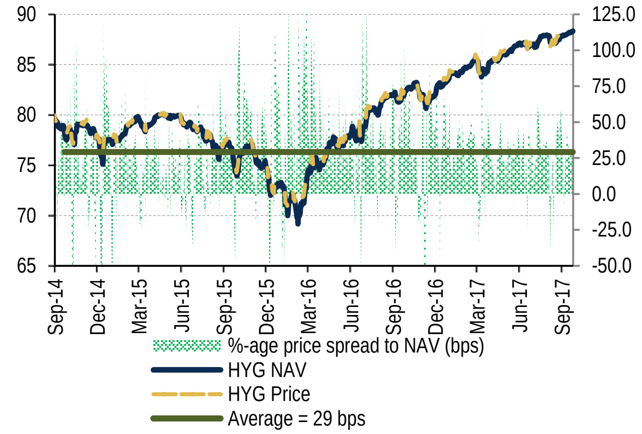
In this context of reduced liquidity, institutions reportedly commonly use HY ETFs within portfolios alongside individual bond holdings as they can provide a buffer during liquidity shortages. Indeed, ETFs are seen as a more liquid alternative to sourcing bonds given the ease of access to a diversified bond portfolio through the ETF redemption process.

Chart 4: HY dealer inventories plummeted post GFC as stricter regulations forced dealers to reduce their market making activity



Source: Federal Reserve Bank of New York. Daily data from 4-Jul-01 to 13-Sep-17.

Chart 5: HYG trades at an avg. premium to NAV of 29bps; however even after factoring this in, transaction costs are still much lower than on HY bonds

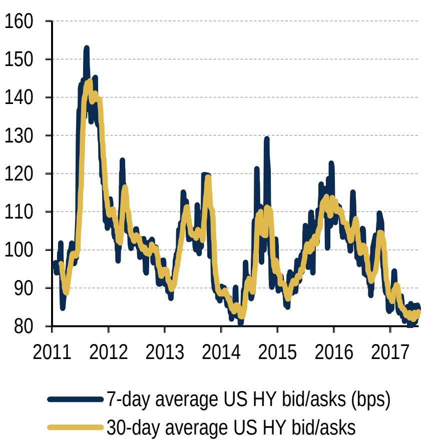


Source: BofA Merrill Lynch Global Research. Daily data from 4-Sep-14 to 28-Sep-17.

For instance the bid-ask spread on HYG (in normal market conditions) is approx. 2bps. Adding an average premium to NAV of 29bps (see Chart 5) on the assumption that the ETF is then exchanged for the underlying bonds through the redemption mechanism, the implied cost is still significantly lower than for HY bonds. Indeed, the bid-ask spread of HY bonds is on the order of 80-100bps (see Chart 6). HYG's tight spreads and deep liquidity have drawn big institutions that use it like a hotel or as temporary place holders, for instance to park cash while ramping up bond portfolio exposure inflows or to make tactical adjustments (e.g., shortening duration ahead of an expected uptick in interest rates).

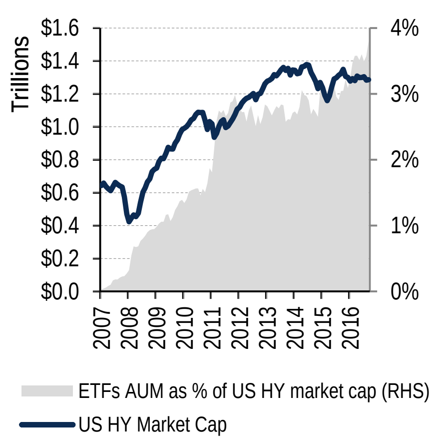
Notably, the liquidity growth in HY ETFs has significantly outstripped asset growth. For instance, while at $49 billion the combined AUM of the top five HY ETFs (HYG, JNK, BKLN, SJNK, SHYG) makes up only 3.8% of the HY cash bond market (see Chart 7), the combined trading notional volume of HYG and JNK alone is 12% as large as HY cash bond trading volume (see Chart 8). The rapid growth in HY ETFs trading volume vs. fund assets implies there is a sizable population of frequent traders and is congruous with the aforementioned idea that HY ETFs are increasingly being used along bond holdings as liquidity enhancement tools.

Chart 6: Bid-ask spreads on HY cash bonds are typically 80 to 120bps vs. ~2bps for HYG, which helps explain popularity of HYG



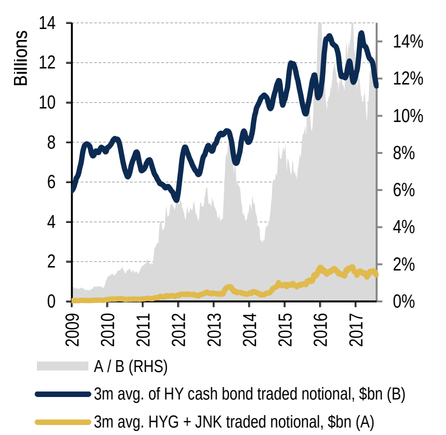
Source: BofA Merrill Lynch Global Research. Daily data from 1-Mar-11 to 31-Aug-17.

Chart 7: In spite of the growing popularity of HY ETFs, they still remain a small fraction of the overall HY market cap…



Source: BofA Merrill Lynch Global Research. Monthly data from Nov-07 to Jul-17.

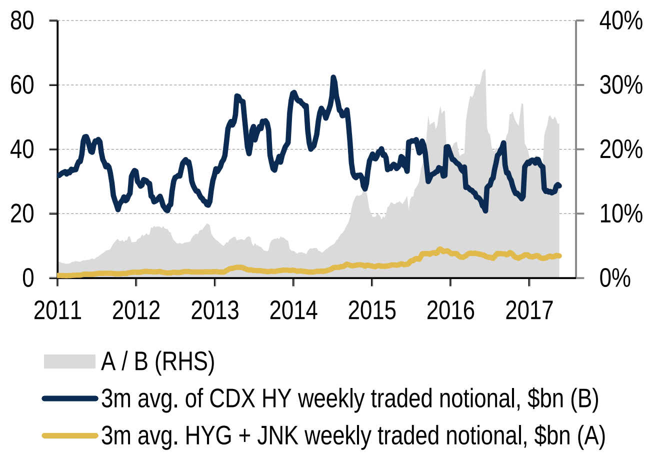
Chart 8: …However, trading volume in HY ETFs is significant vs. HY market, in line with the idea that ETFs are used as liquidity sleeves



Source: BofA Merrill Lynch Global Research. Weekly data from Feb-09 to Sep-17.

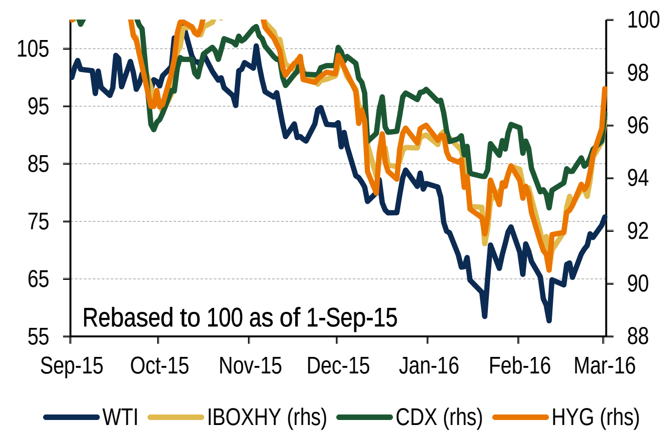
Incidentally, HY ETFs have also seen a dramatic surge in volume w.r.t. to HY CDS (see Chart 9). This is consistent with anecdotal evidence that some investors have adopted bond ETFs in place of credit derivatives as HYG managed to track more closely HY cash bonds performance than CDX during the Q4-15 oil sell-off (see Chart 10).

Chart 9: Over the past 3 years HY ETF trading volume has seen a surge w.r.t. to CDX trading volume…



Source: BofA Merrill Lynch Global Research. Weekly data from Jan-11 to Sep-17.

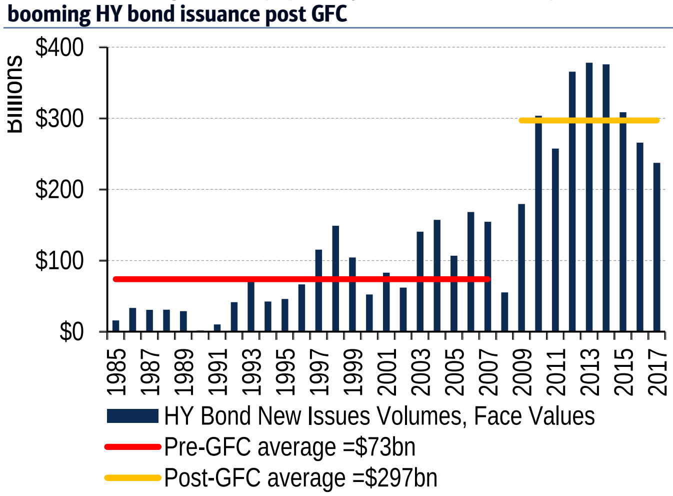
Chart 10: …as CDX failed to track HY bonds as well as HYG during the Q4-15 oil sell-off due to lower energy sector exposure in CDX



Source: BofA Merrill Lynch Global Research. Daily data from 1-Sep-15 to 1-Sep-17.

The explosion in HY bond issuance in the post-GFC years is another likely reason behind the growth in popularity for HYG as the ETF provides easy access to the booming HY bond market (post-crisis average yearly HY bond issuance is 4x as large as in the pre-crisis years) (see Chart 11).

Chart 11: The surge in HYG popularity occurred also in response to booming HY bond issuance post GFC



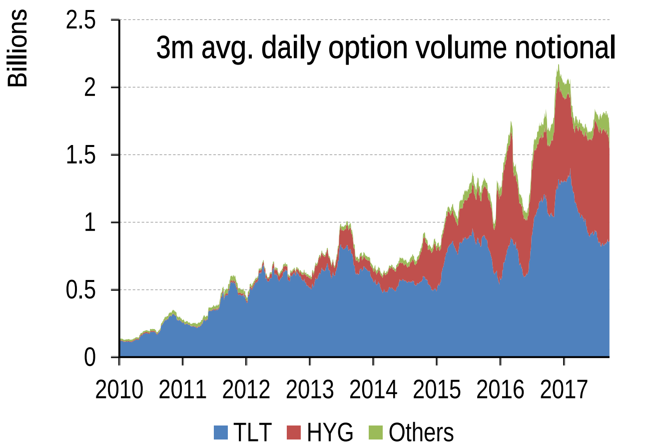
Source: BofA Merrill Lynch Global Research. Yearly data from 1997 to 2017

2. Understanding FI ETF option liquidity

HY ETF popularity begets surge in their option liquidity

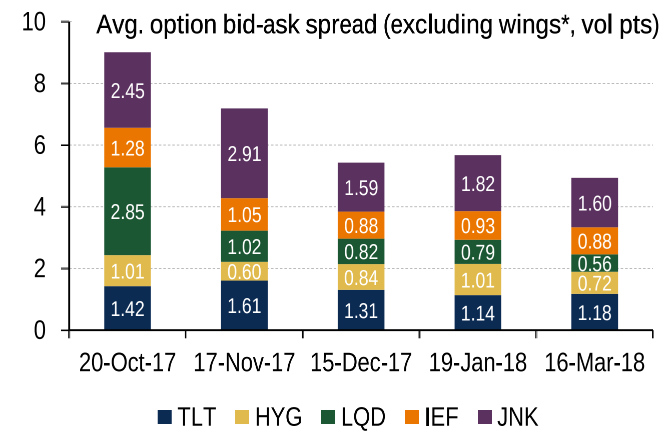
Along with growth in the FI ETF market, there has been a similar rise in the use of options on FI ETFs. Indeed, daily notional option volume for the top five FI ETFs (by option liquidity) now totals $1.7 billion per day and the average option bid-ask spread for options expiring up to six months out is less than 1.3 vol pts wide. Notably, daily notional option volume on HYG now rivals that of TLT (see Chart 12), which only three years ago had option markets more than 3x as liquid. In addition, among fixed income ETFs with the most liquid options, HYG short dated options are the ones with lowest average bid-ask spread (see Chart 13).

Chart 12: Liquidity in FI ETFs options has rapidly grown in the past three years, with TLT and HYG now battling for the throne



Source: BofA Merrill Lynch Global Research. Daily data from Jan-10 to 22-Sep-17.

Chart 13: Short dated HYG options have the lowest bid-ask spreads among the most popular FI ETFs



Source: BofA Merrill Lynch Global Research. Data as of 22-Sep-17. *Average bid-ask spread is calculated across puts with a delta<-25 and calls with a delta>25.

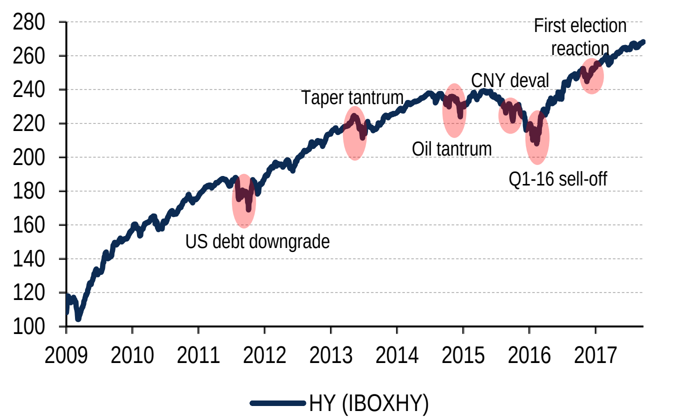
3. Decomposing sources of risk in HY

Historically HY bonds have exhibited a strong beta to equity, credit, rates and oil (see Chart 14). Focusing for the moment on rates and oil (see p. 12 and 13 for more details on the relationship w.r.t. equity and credit), the correlation of HY cash bonds to rates and oil has shown a remarkable ability to invert sign and increase in times of stress (see Chart 15).

For instance the correlation between IBOXHY and 10yr Treasury yields went from a peak of 0.4 to a trough of almost -0.6 following the Taper tantrum in 2013. This correlation moved into negative territory again in 2017, following the initial sell-off in Treasuries post-election.

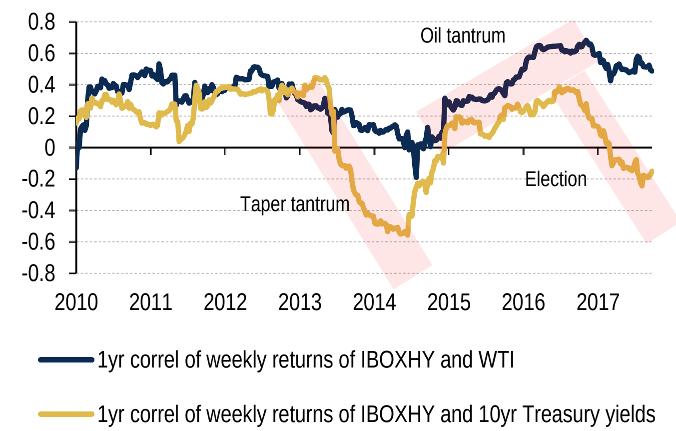
Similarly, the oil tantrum in Nov-14 witnessed a sharp increase in the correlation between IBOXHY and WTI, and this correlation has been on an uptrend during 2015 and for most part of 2016 (Chart 15).

Chart 14: Historically HY bonds have displayed high sensitivity to rates, credit, equity and oil



Source: BofA Merrill Lynch Global Research. Daily data from 2-Jan-09 to 22-Sep-17.

Chart 15: HY bonds exhibit a stronger correlation to rates and oil in times of market stress



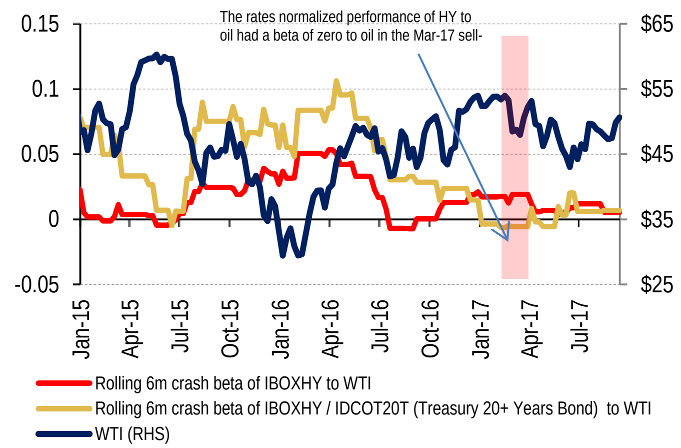
Source: BofA Merrill Lynch Global Research. Daily data from 2-Jan-10 to 22-Sep-17.

However, the sensitivity to oil is starting to show signs of fatigue. For instance our credit strategists highlighted how the energy sector impact was isolated during the latest sell-off in oil in the Jun-17 sell-off.

Indeed, once we strip out the relative performance of HY bonds to rates (to isolate the beta to its non-rates components) HY bonds shows no beta to oil during the Mar-17 sell-off (see Chart 16). While the HY cash bond universe continues to have a high exposure to the Energy sector (see Chart 17), its diminished sensitivity to oil sell-offs can be attributed to different reasons, including i) plummeting correlation between Energy and non-energy parts of the market, ii) improving fundamentals in HY energy (e.g., leverage has ticked down, interest coverage has picked up, revenue and earnings growth has been the best in many quarters), iii) decreased volatility in the HY energy sector due to major recapitalization over the past three years, and iv) more defensive positioning in the HY energy sector which makes the forced selling that took place from Oct-14 to Feb-15 less likely.

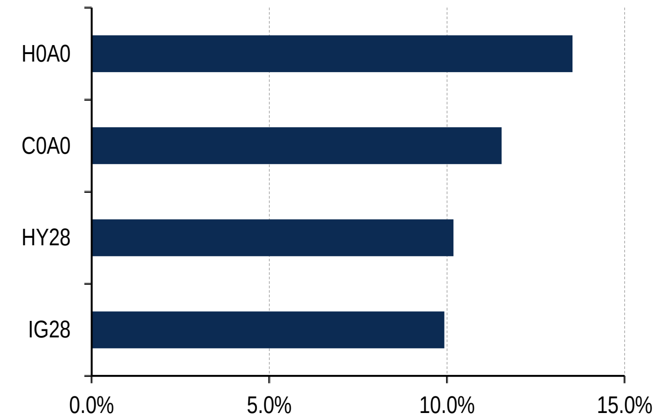
All of this is indicative of the reduced nervousness of HYG bondholders w.r.t. energy which means perhaps a much sharper sell-off in oil than the ones witnessed YTD needs to materialize for it to have a pronounced impact on HY bonds.

Chart 16: Crash beta of HY to oil is much lower now vs. the avg. level in 2015/16, especially when normalized for rates performance



Source: BofA Merrill Lynch Global Research. Weekly data from 10-Jan-15 to 22-Sep-17.

Chart 17: Energy sector weight, % market value

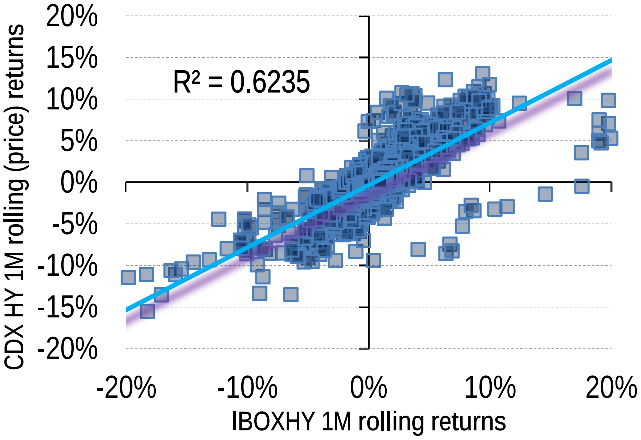


Source: BofA Merrill Lynch Global Research. Data as of 23-Jun-17. H0A0 = BofA Merrill Lynch US High Yield Index, C0A0 = BofA Merrill Lynch US Corporate Index, HY28 = CDX North American High Yield Index Series 28, IG28 = CDX North American Investment Grade Index Series 28.

4. Decomposing sources of risk in HY vol

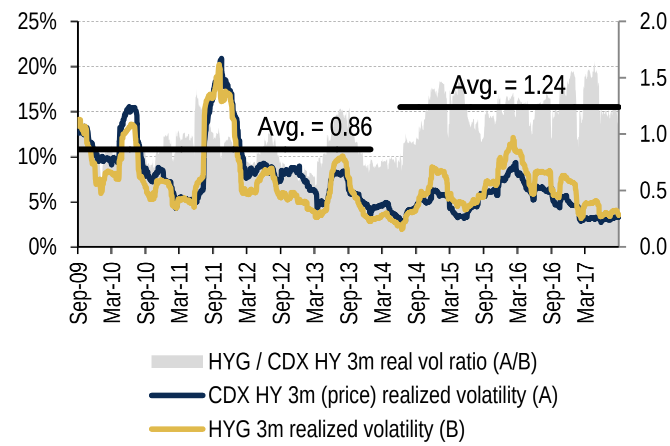
Since HYG tracks the investment results of an index composed of HY corporate bonds, HYG has a high exposure to credit risk and as such its returns are highly correlated with those of CDX HY (see Chart 18). As a result, realized (and implied) volatility between HYG and CDX HY broadly track each other (see Chart 19). However, price moves (and consequently volatilities and the cost of protecting downside moves) can differ quite significantly for different reasons, including: i) HYG's exposure to rates, and ii) different portfolio characteristics of the underlying exposures (sectors, maturities, # of underlyings).

Chart 18: The inherent exposure to credit in HYG makes HYG returns highly correlated to CDX HY returns...



Source: BofA Merrill Lynch Global Research. Daily data from 8-Nov-05 to 26-Sep-17.

Chart 19: ...However, significant divergences in price moves – and therefore in the relative volatilities – arise; for instance for the past 3 years HYG vol has been consistently higher than CDX HY volatility



Source: BofA Merrill Lynch Global Research. Daily data from 25-Sep-09 to 22-Sep-17.

Comparing HYG volatility to rates and credit volatilities

HYG options are essentially options on HY bond portfolios and as such options on portfolios of combined interest rate and spread exposure. Hence, HYG volatility is a function of rates and CDX HY volatilities as well as their correlation. Since HYG trades on a price basis, HYG options are quoted on a price volatility basis. On the other hand, rates and CDX swaptions trade on a yield or spread volatility basis. One way to put the different vols on equal footing is to convert rates and CDX swaption yield and spread vols into price vols, which can be done using the following formulas:

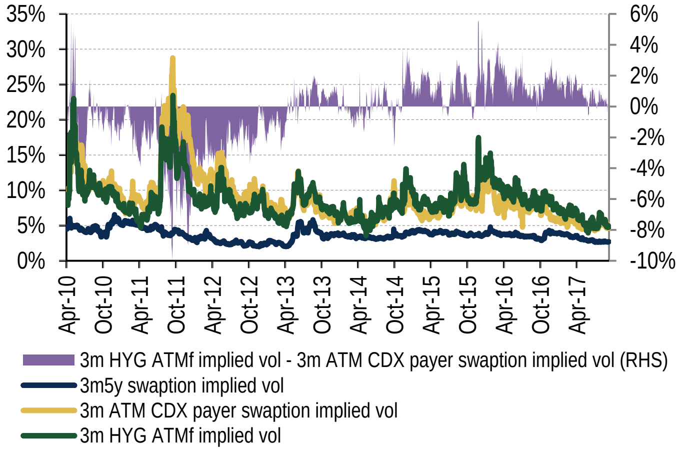
- *Price vol of rate swaption = implied yield vol x ATMf strike x Duration*
- *Price vol of CDX swaption = implied spread vol x Fwd spread level x Duration*

As an example, on 3-Mar-15 the 3m ATM implied price vol on HYG was 7.98%. On that same day, a 3m5y ATM rate swaption (chosen to have a similar duration as HYG) had a yield implied volatility of 47.57%. Given a duration of 4.82 and an ATM forward strike level of 1.88%, the corresponding price volatility was 4.31% (=47.57% x 1.88% x 4.82). Similarly, a 3m ATM CDX payer swaption had a spread implied volatility of 42.7%. Given a forward spread level of 341.23 bps and a duration of 4.03, the resulting price implied volatility was 5.87% (=42.7% x 3.4123% x 4.03).

Taper tantrum caused a much sharper repricing in HYG implied vol vs. CDX HY

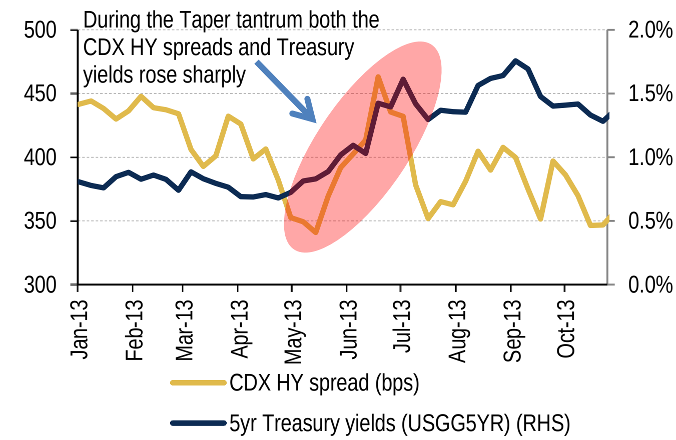
Given that rates and spreads generally are negatively correlated, theoretically HYG implied vol should lie in between the volatility of similar duration interest rate options and spread options due to portfolio diversification effects. Over the past 8 years that has generally been the case up to May-13. However, the 'Taper Tantrum' caused an abrupt switch in the sign of the HYG vs. CDX implied vol spread (see Chart 20). This was likely due to rates volatility spiking on the one hand, and CDX spreads widening at the same time as treasury yields were increasing on the other, breaking the traditional negative correlation between the two (see Chart 21).

Chart 20: HYG vs. CDX HY implied vol spread abruptly turned +ve during the Taper tantrum and has largely remained positive ever since



Source: BofA Merrill Lynch Global Research. Daily data from 19-Apr-10 to 27-Sep-17.

Chart 21: The break in the typical -ve correl of rates and spreads during the Taper tantrum contributed to the sharp repricing in HYG vol

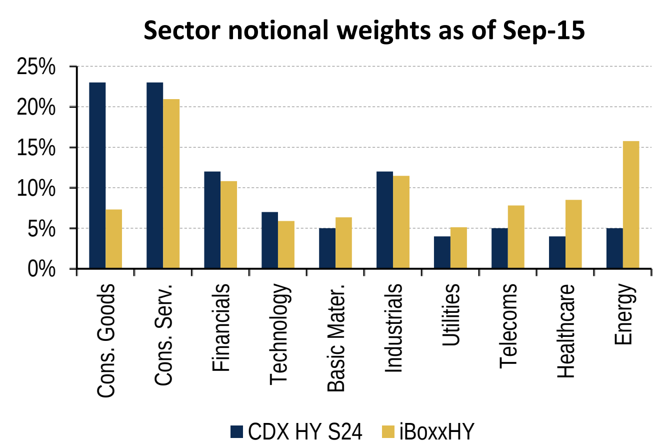


Source: BofA Merrill Lynch Global Research. Daily data from 4-Jan-13 to 27-Oct-13.

Greater HYG exposure to Energy contributed to higher vol in the past 3yrs

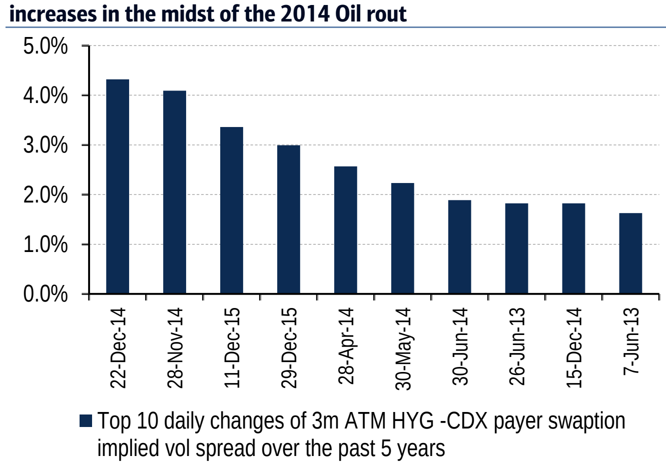
Even taking into account the exposure to rates, the relative performance between HY bonds and CDX HY can diverge quite significantly as the credit exposure differs in terms of its characteristics. In particular, for most of the past 3 yrs HYG has had a significantly larger exposure to energy than CDX HY. For instance, as of Sep-15 the HYG notional exposure to the Energy sectors was 3x as large as for CDX HY (see Chart 22).

Chart 22: HYG (IBOXHY) used to have a much larger exposure to the Energy sector than CDX HY, which likely has contributed to keeping the HYG – CDX implied vol spread structurally bid over the past 3 years



Source: BofA Merrill Lynch Global Research

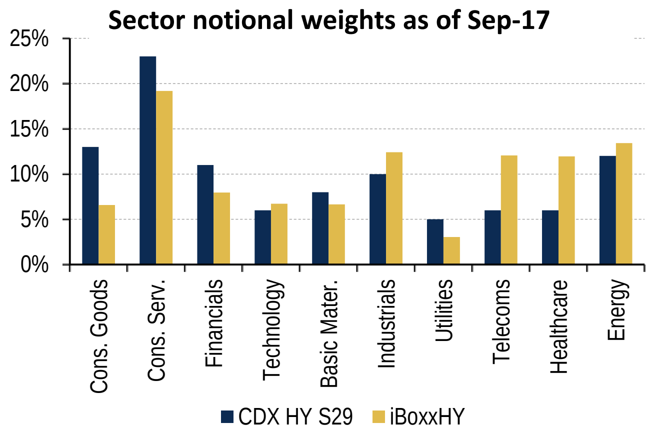
Chart 23: The HYG–CDX implied vol spread has been highly reactive to oil price moves; for instance, the spread recorded its top two 5yr daily increases in the midst of the 2014 Oil rout



Source: BofA Merrill Lynch Global Research. Daily data from 22-Sep-12 to 25-Sep-17.

Incidentally, the HYG – CDX HY implied vol spread has been positive for most of the past 3 years having risen in tandem with the oil-led energy sell-off. This is more vividly seen during the Oil Tantrum in 2014, when the 3m HYG – CDX HY implied vol spread recorded its top two 5yr daily increases (Chart 23). Notably, the differential in Energy exposure between HYG and CDX HY has recently narrowed (see Chart 24), which coincides with a recent downtrend in the HYG – CDX HY implied vol spread (see Chart 20) and a lower sensitivity of HYG to the oil sell-offs seen YTD (see Chart 16).

Chart 24: The recent decrease in the relative exposure to Energy of HYG vs. CDX HY may partly explain the recent compression in the HYG-CDX HY implied vol spread



Source: BofA Merrill Lynch Global Research

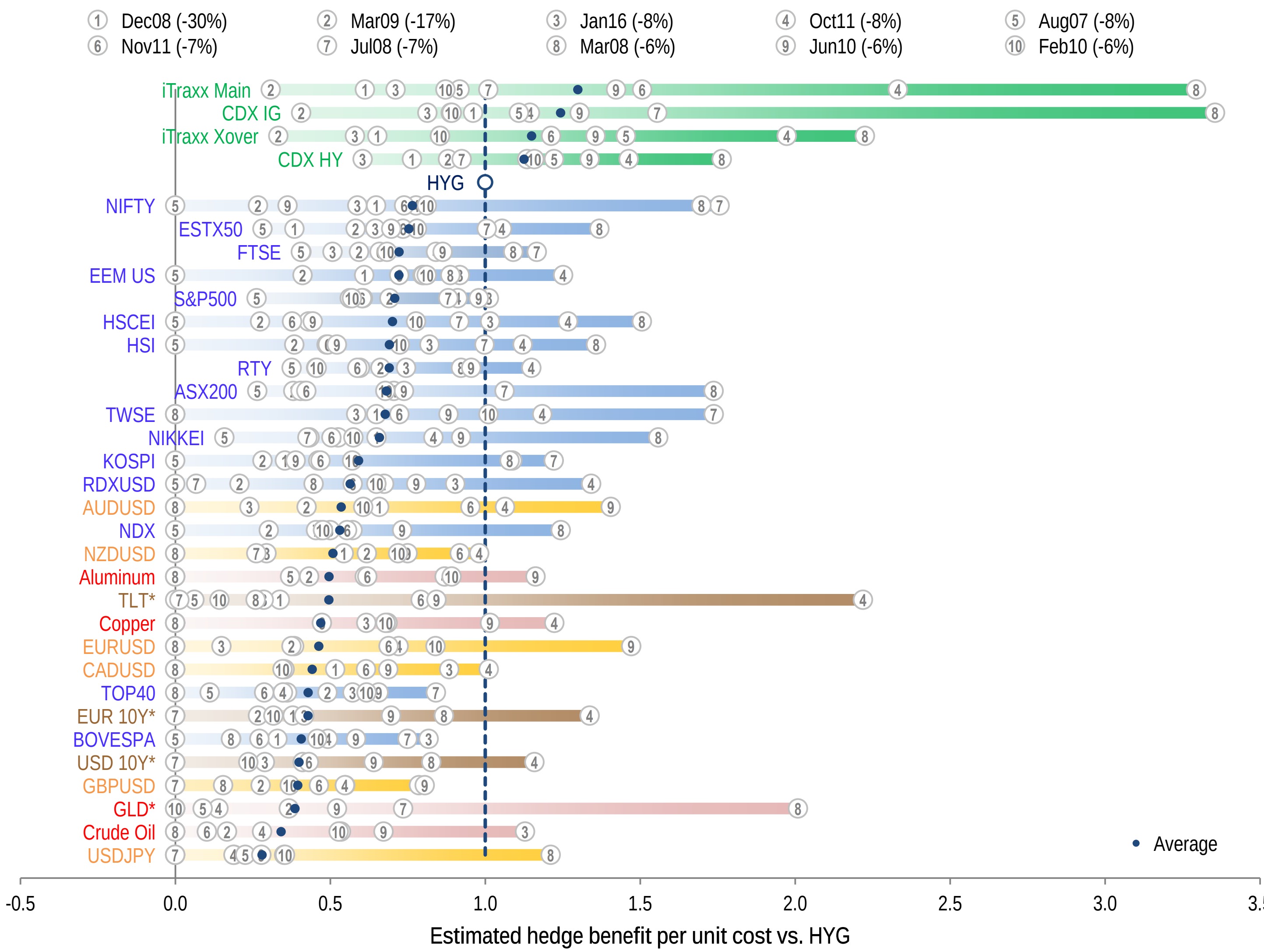
5. Assessing a HY credit hedge

In Chart 25 we show ratios of historical crash betas versus HY Credit (HYG) to relative hedge costs (for a detailed explanation of the methodology, see Benchmark proxy hedging in Finding cheap hedges: the framework, p.22). Whenever a proxy asset does not decline for a given sell-off in the benchmark, this hedge benefit is registered as 0, highlighting the basis risk of proxy hedging. For appropriate proxy hedges, we look for:

- Average hedge benefit per unit cost > 1 (better value than the benchmark hedge)
- Closely distributed hedge benefits in past sell-offs (consistency of proxy hedge)
- Min hedge benefit > 0 (low basis risk to benchmark)

US & EU credit payers screen as better value hedges than HYG puts on average, at current pricing. As such investors concerned about tail credit risk should currently favor credit payers to HYG puts.

Chart 25: Proxy hedge screen: HY Credit Benchmark



Source: BofA Merrill Lynch Global Research. Data: 4-Sep-17. *Call volatility (Receiver premia) used for TLT US (EUR & USD 10Y rates).

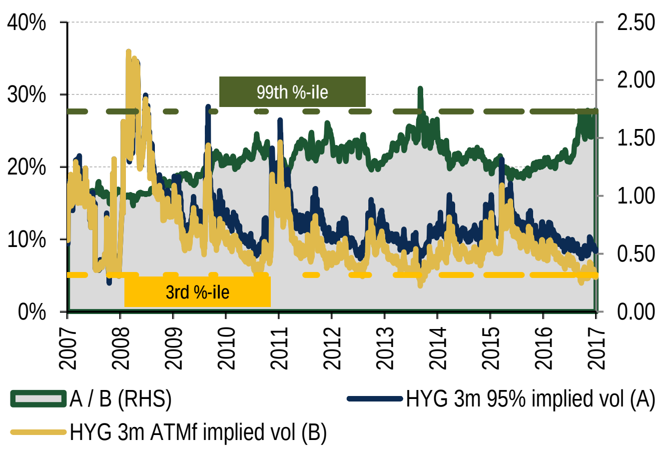
6. Trade Ideas

Hedge a coordinated bond/equity sell-off while levering cheap vol/steep skew

The high sensitivity of HYG to both rates and equity makes it an ideal candidate to hedge a coordinated sell-off in bonds and equities similar to the Taper Tantrum in May/Jun-13 or the risk-off event in Aug-15. This risk is particularly relevant for multi-asset portfolio managers that invest both in equities and bonds. These diversified portfolios have benefited from low bond/equity correlation and have outperformed both equities and bonds YTD on a risk-adjusted basis. However, during both the 'Taper Tantrum' and Aug-15 sell-off, a multi-asset manager saw declines that were the largest since 2008 and equal to 50% of the drawdowns experienced in the GFC.

To hedge the risk of a coordinated bond/equity sell-off – in light of Fed balance sheet reduction and uncertainty over a change in Fed leadership – we recommend taking advantage of 3m HYG ATMf implied vol trading near its all-time lows as well as HYG 3m put skew near its highs to get long short dated HYG puts / put spreads (see Chart 26). For instance, a HYG Dec17 88.0 put (ref. 88.8) costs indicatively 1.3%. Selling an 84.0 put against it reduces the initial outlay by almost a third to 0.9%.

Chart 26: With HYG short dated implied vol at its floor and put skew near all-time highs, hedge a risk-off event via puts/put spreads



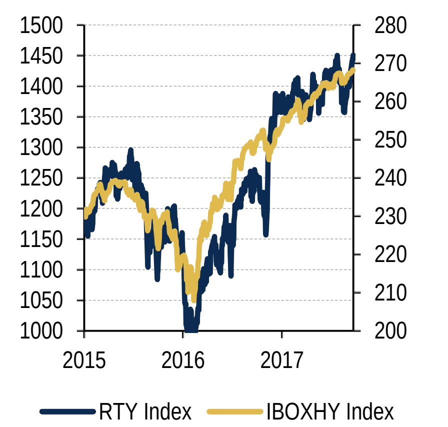
Source: BofA Merrill Lynch Global Research. Daily data from 25-Sep-17 to 25-Sep-17.

As a caveat, long HYG put holders need to be cognizant of their implicit long exposure to the borrow rate which anecdotally exhibits cyclical and particularly volatile patterns, as it tends to rise sharply in times of stress. This is due to typical high demand for shorts relatively to available tradable shares. As a consequence, establishing a long HYG put position requires monitoring the borrow rate and choosing an opportune entry point.

HYG/IWM vol gap creates opportunity: own IWM puts outright or vs. HYG puts

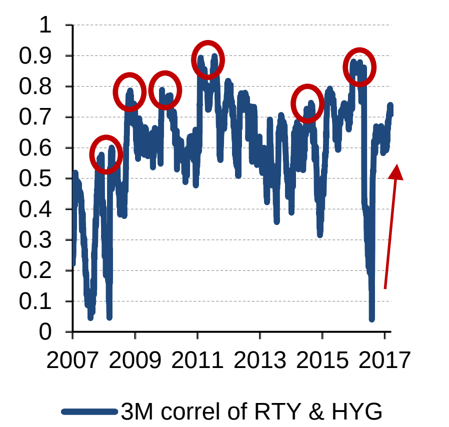
HY bonds are typically very well correlated to US small cap equities (see Chart 27). Importantly, when this correlation shows signs of abatement (as was the case immediately after the election), it tends to re-couple in risk-off events (see Chart 28). Small cap realized vol has fallen to near 20-year lows putting downward pressure on implied volatility which has fallen back to near 2008-present lows. This has contributed to create an extreme gap in volatilities between US small cap equities and HYG with IWM (Russell2000) 3m 25-delta vol never trading as cheap vs. HYG over the past year (see Chart 29). As a consequence, we think OTM IWM puts could provide investors with superior leverage in a severe sell-off. For instance, an IWM Dec17 140 put (ref. 148.2) costs indicatively 1.0%.

Chart 27: HY bonds and small cap equities are generally well correlated…



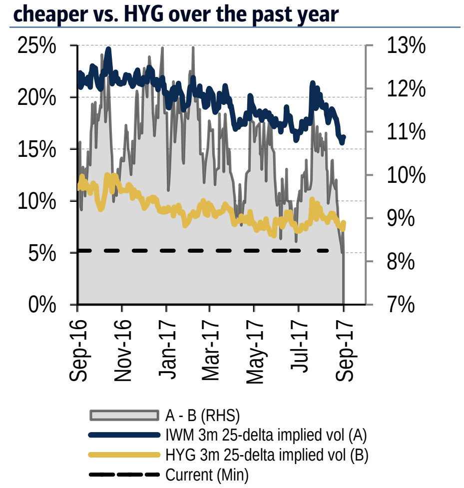
Source: BofA Merrill Lynch Global Research. Daily data from 1-Jan-15 to 22-Sep-17.

Chart 28: …especially in times of stress when this correlation tends to re-couple



Source: BofA Merrill Lynch Global Research. Daily data from 11-Jul-17 to 22-Sep-17.

Chart 29: IWM 3m 25-delta vol has never been cheaper vs. HYG over the past year



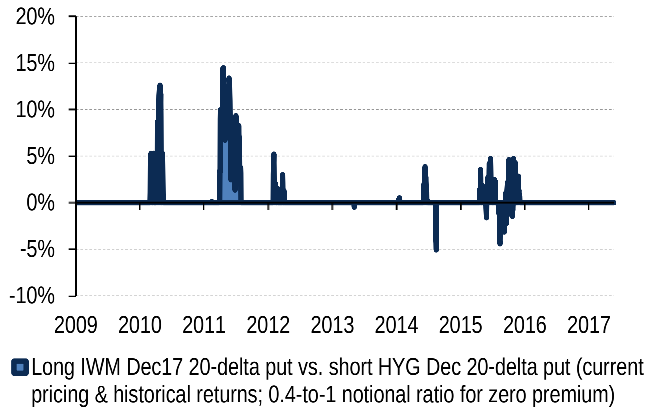
Source: BofA Merrill Lynch Global Research. Daily data from 26-Sep-17 to 22-Sep-17.

Alternatively, investors can sell HYG puts to fund their IWM puts. Indeed at current pricing, long 3m OTM puts on IWM, funded by selling 3m OTM puts on HYG, offers highly asymmetric risk-reward. For example, Chart 30 illustrates the historical hold-to-expiry returns of a long IWM Dec17 139.0 (20-delta) put (ref. 148.2) vs. short HYG Dec 85.0 (20-delta) put (ref. 88.8) trade (initiated at current ask/bid pricing), sized to be zero-premium upfront. Table 1 shows that:

- Over the past 8yrs, the trade would have lost money only 2.2% of the time on a hold-to-maturity basis. The average return when positive (4.2%) would have been 3.0x the average return when negative (-1.5%). The max gain (14.5%) would have been 3x the max loss (-2.3%).
- Gains would have been more muted over the past 3yrs, however, they would have been more frequent (12.8% vs. 11.9% of the time).
- Importantly, owing to asymmetric current pricing as well as OTM put strikes, the trade would have performed well in the Oct-14 Growth Tantrum, the Aug-15 CNY devaluation, as well as the Q1-16 sell-off.

Alternatively, investors less averse to paying a small premium upfront can overweight the long IWM put exposure. For example, the notional beta implied by sizing Dec17 20-delta puts to be zero-premium (0.4, as indicated in Chart 29) suggests IWM should move 2.5x (=1/0.4) as much as HYG. However, the trailing 3m realized beta has averaged 1.5 YTD. Hence, sizing the trade based on the current average realized beta YTD amounts to a notional beta of 0.7 instead of 0.4. The trade would then cost around 28bps upfront instead of 0bps but would be short less HY risk.

Chart 30: Scenario analysis for long IWM / short HYG Dec17 20d puts (sized to be 0-cost), using current pricing and historical returns



Source: BofA Merrill Lynch Global Research. Daily data from 4-May-09 to 27-Sep-17.

Table 1: At current pricing, long IWM / short HYG Dec17 20d puts (sized for 0-cost) would have offered highly asymmetric risk-reward over the past 8yrs

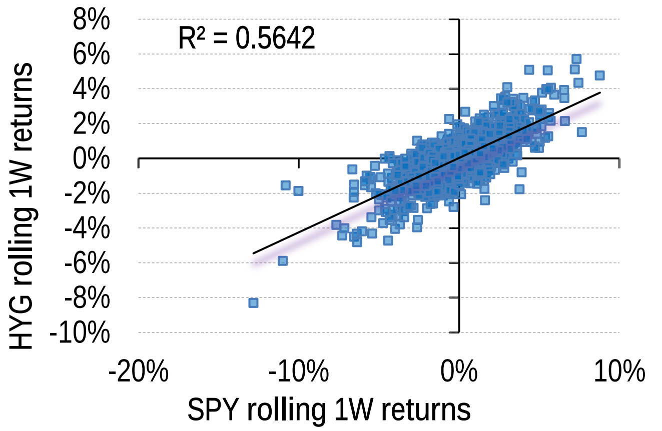
	Past 8 years	Past 4 years
Probability of positive return	11.9%	12.8%
Probability of negative return	2.2%	5.9%
Average return when return is positive	4.2%	1.9%
Average return when return is negative	-1.5%	-1.6%
Maximum gain	14.5%	4.7%
Maximum loss	-5.1%	-5.1%

Source: BofA Merrill Lynch Global Research. Daily data from 4-May-09 to 22-Sep-17. Backtesting is hypothetical in nature, reflects the application of strategies prior to their introduction, and is not intended to be indicative of future performance.

Chase year-end HY upside without adding downside risk via cheap HYG calls

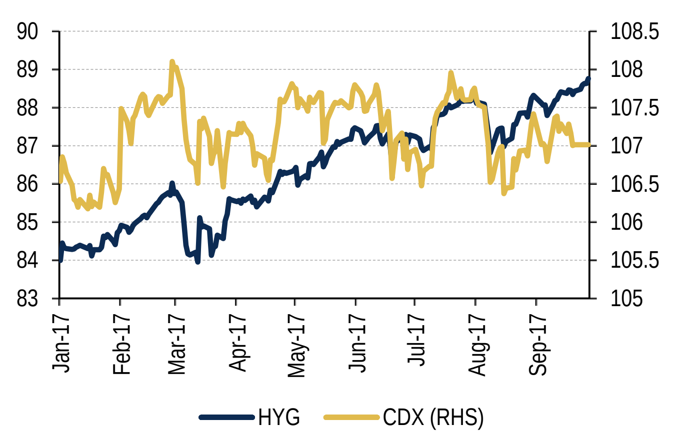
HYG returns are highly correlated to equity returns (see Chart 31). Hence, should equity continue to rally for the remainder of the year, it is likely HYG will follow suit. Importantly, HY bonds have managed to rally in the past 6m even with credit spreads moving sideways YTD (see Chart 32). A potential catalyst for the next equity rally could be, for instance, optimism building for a potential tax reform. For investors that have lagged their HY benchmark YTD or would like to de-risk their portfolio but have fear of missing out on a potential year-end rally, we recommend chasing upside into year-end without adding downside risk by buying ultra-cheap upside volatility on HYG. To put things in context, 3m ATMf implied volatility on HYG is only half as large as on SPY, in spite of HYG returning as much as 62% as SPY in the past 6m. Notably, the HYG/SPY 3m ATMf implied vol ratio has hardly ever been as low in the past two years (see Chart 33). In addition, HYG has the cheapest upside vol on a historical basis among ETFs that have a high correlation to SPX (see Chart 34). For instance a long HYG Dec17 89.0 call costs indicatively 0.3% (ref. 88.8).

Chart 31: HYG returns are highly correlated to SPX returns



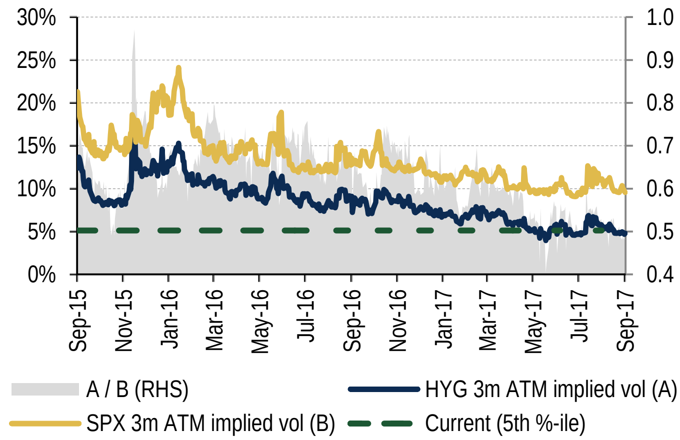
Source: BofA Merrill Lynch Global Research. Daily data from 25-Sep-09 to 28-Sep-17.

Chart 32: HY bonds have been able to rally in the past 6m in spite of CDX spreads moving sideways YTD



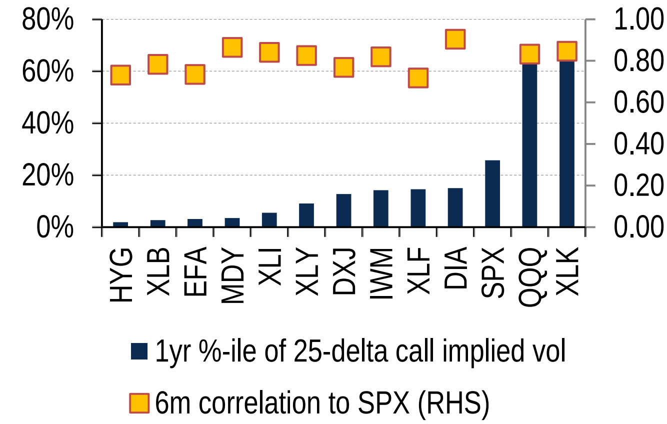
Source: BofA Merrill Lynch Global Research. Daily data from 31-Dec-16 to 29-Sep-17.

Chart 33: Short dated implied vol on HYG is half as large as on SPY in spite of HYG returning as much as 62% as SPY in the last 6m



Source: BofA Merrill Lynch Global Research. Daily data from 29-Sep-15 to 29-Sep-17.

Chart 34: HYG upside vol is the cheapest among ETFs that are highly correlated to SPX



Source: BofA Merrill Lynch Global Research. Daily data from 27-Sep-16 to 27-Sep-17.

ETF option trades to implement BofAML asset allocation and positioning view

Table 2: Asset allocation recommendations and ETF option trades to implement them (open date of trades = 10-Mar-17, with the exception of NA and EM Equities bullish risk reversals opened on 28-Sep-17)

Asset Class	Core View	Rationale	Trade Recommendation*
Equities	Bullish		Buy ACWI Oct17 63 bullish risk reversal @ -0.2% (ref. 62.78)
North America	Bullish	BofAML's S&P 500 target for YE 2017 is 2450, based on 2017E EPS of $129. Savita Subramanian sees greater potential for a 5-10% correction and argues positioning matters most in the short term. OW financials, health care, energy, and telecom; UW materials, staples, and utilities.	Buy SPY Mar18 250 bullish risk reversal @ 0.1% (ref. 250.35)
Eurozone	Bullish	Ronan Carr has a Stoxx 600 target of 420 with equities in a mid-cycle environment favoring a balance between cyclical and defensive sectors. OW financials, healthcare, construction, and chemicals; UW retail, travel, and autos	Buy HEDJ Jan18 61.20 bullish risk reversal @ 0.2% (ref. 61.15)
UK	Bullish	Robert Wood remains pessimistic on the UK economy (expecting 1.5% growth in 2017); Tommy Ricketts prefers UK multinationals rather than local companies, esp. given upside for oil prices.	Buy EWU Jan18 32 bullish risk reversal @ -2.1% (ref. 31.66)
Japan	Bullish	Shusuke Yamada expects JPY to weaken to 120 in 2017, with a Nikkei target of 21,000, favoring cyclicals over defensives, especially banks and insurance. Izumi Devalier targets 2017 growth of 1.5% and core inflation of 1.2% as fiscal and monetary policy realign.	Buy DXJ Jan18 51.78 bullish risk reversal @ 1.1% (ref. 52.14)
Pacific Rim	Bullish	Fundamentals are exceptionally good in Asia and financial vulnerability is at multi-decade lows, per Ajay Kapur. Helen Qiao expects stable growth in Asia ex-Japan in 2017 supported by strong export growth	Buy FXI Jan18 38 bullish risk reversal @ -2.1% (ref. 37.65)
EM Equities	Bullish	Ajay Kapur sees more upside to come for EM, with inevitable corrections to be used as buying opportunities. OW Korea, China,Taiwan, Turkey; UW Mexico, Chile, South Africa, Malaysia, India, Philippines.	Buy EEM Mar18 44 bullish risk reversal @ 0.3% (ref. 44.3)
Fixed Income	Bearish		
Government	Bearish	*US*: Fed funds to end 2017 at 1.375% (one hike). Shyam Rajan expects 10y Treasury yield to hit 2.85% by YE 2017; core convictions: bearish duration, short real rates *Europe*: Ralf Preusser expects 10y Bund yield to hit 0.55% by YE 2017; long curve steepeners, short breakevens vs the US	Buy TLT Jan18 117-110 put spread @ 2.9% (ref. 117.25)
Investment Grade	Bearish	Hans Mikkelsen expects 3.5-4.5% total returns, and highlights risks to higher quality spread products from the Fed's planned balance sheet reduction	Buy LQD Jan18 116 bearish risk reversal @ 1.9% (ref. 116.01)
High Yield	Bearish	BofAML expects 4-5% total returns in 2017 as dollar strength, rate risk & political volatility provide headwinds. OW energy, gaming, and telecom; UW autos, food, healthcare, leisure, real estate, tech, and utilities.	Buy HYG Jan18 86 bearish risk reversal @ 4.0% (ref. 86.30)
EM Debt	Bearish	Anne Milne expects 1.3% (IG) and 1.9% (HY) returns based on spread widening and higher Treasury yields. OW Brazil, Turkey, and Indonesia; UW Mexico & South Korea.	Buy EMB Jan18 112 bearish risk reversal @ 3.8% (ref. 111.92)
Securitized Products	Bearish	Chris Flanagan expects spread widening as rates move higher; shorten rate & spread duration	Buy MBB Sep17 105 bearish risk reversal @ 1.5% (ref. 105.41)
Commodities	Bullish		
Energy	Bullish	Francisco Blanch sees 2017 averages of $50/bbl and $47/bbl for Brent and WTI, respectively. OPEC production cuts will support prices, but output is set to rise and oil demand has been disappointing. Geopolitical tail risks could send oil to $60/bbl or higher.	Buy USO Jan18 10 bullish risk reversal @ 4.2% (ref. 10.29)
Industrial Metals	Bullish	Michael Widmer is bullish on aluminium and zinc, and bearish on iron ore	Buy XME Jan18 30 bullish risk reversal @ 0.3% (ref. 29.92)
Precious Metals	Bullish	Michael Widmer sees room for higher gold prices on rising core inflation and cross-asset volatility; 2017E of $1,276/oz.	Buy GLD Jan18 115 bullish risk reversal @ 1.0% (ref. 114.72)

Source: BofA Merrill Lynch Global Research. Data as of 14-Sep-17. *Negative numbers indicate risk reversals can be bought for a credit at initiation. Please refer to the Appendix on pg. 6 for fund specifications including security name and liquidity metrics.

ETF option trades to implement BofAML US equity core view

Table 3: BofAML US Equity core view and ETF option trades to implement them (open date of trades = 10-Mar-17 with the exception of Discretionary risk reversal opened on 13-Sep-17)

Sector / Size	Core View	Rationale	Trade Recommendation
Discretionary	Bearish	The sector has outperformed year-to-date, but typically underperforms staples when savings rise, which could occur given rising rates. The jobs picture is probably as good as it gets, and may no longer represent a tailwind to increased consumer spending. Further, Discretionary typically underperforms as the Fed tightens.	Buy XLY Jan18 91 bearish risk reversal @ 0.9% (ref. 90.69)
Financials	Bullish	Key beneficiary of rising rates, steeper yield curve, higher volatility. Attractive valuations (P/B) and earnings revisions are improving. Banks, brokers, insurers likely beneficiaries of reduced regulation.	Buy XLF Jan18 25 bullish risk reversal @ -0.6% (ref. 24.79)
Health Care	Bullish	Should get less pricing scrutiny under new administration; earnings and sales improving and PMs have reduced exposure. Prefer managed care and biotech, pharma for yield; watch exposure to hospitals and devices if ACA gets revised/repealed.	Buy XLV Jan18 76 bullish risk reversal @ -0.1% (ref. 75.98)
Materials	Bearish	Benefits from commodity price strength and "buy American," but most exposed sector to China and still has excess capacity.	Buy XLB Jan18 52 bearish risk reversal @ 1.1% (ref. 52.11)
Utilities	Bearish	Expensive and hurt by rising rates; leverage and earnings volatility are both high. Should benefit from lower corporate tax rates.	Buy XLU Jan18 51 bearish risk reversal @ 2.7% (ref. 50.96)

Source: BofA Merrill Lynch Global Research. Data as of 14-Sep-17. *Negative numbers indicate risk reversals can be bought for a credit at initiation. Please refer to the Appendix on pg. 6 for fund specifications including security name and liquidity metrics.

APPENDIX

Listed options expiration schedules and liquidity monitor for 53 ETFs

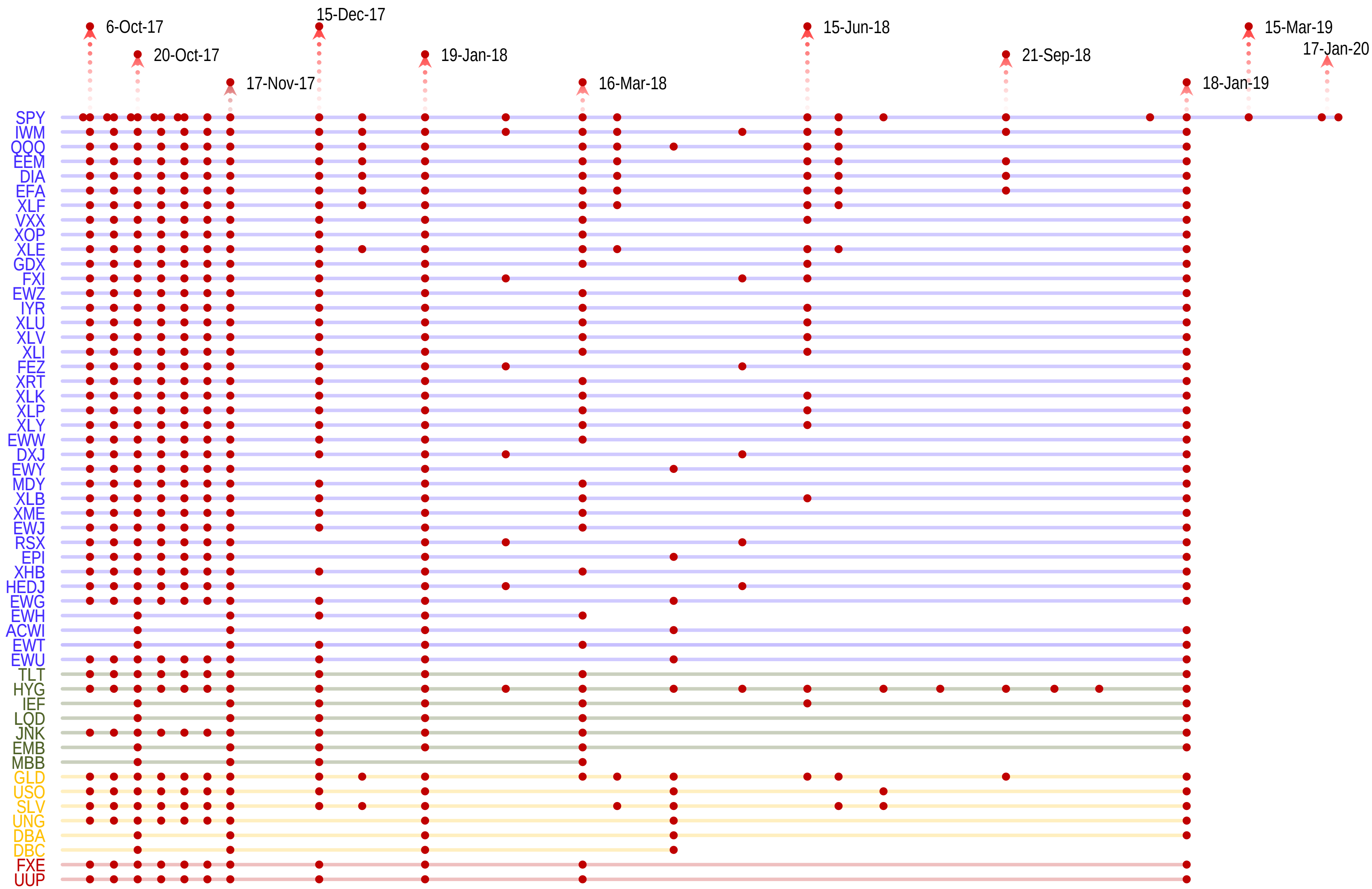
Table 4: Table is ordered by asset class first, and within asset class by average daily notional option volume over the past 3m

Description			Expiration schedule		Liquidity				
Security Name	Symbol	Asset Class	Cycle	Listings outside regular schedule*	Total Call OI	Total Put OI	Total OI	Avg. daily option volume notional over past 3m	Option avg. bid/ask spread (vol pts)**
SPDR S&P500 ETF Trust	SPY	Equity	Mar	2-7w, 3F x2, L x8, Q x4	177B	387B	564B	58B	0.08
PowerShares QQQ Trust Series 1	QQQ	Equity	Mar	2-7w, 3F x2, L x2, Q x4	28B	67B	96B	11B	0.17
iShares Russell 2000 ETF	IWM	Equity	Feb	2-7w, 3F x3, L x3, Q x4	24B	71B	95B	7B	0.35
iShares MSCI Emerging Markets	EEM	Equity	Mar	2-7w, 3F x1, L x3, Q x4	10B	28B	38B	1B	0.74
iPATH S&P 500 VIX Short-Term F	VXX	Equity	Mar	1-7w, 3F x1, L x2	7B	8B	15B	641M	2.76
SPDR Dow Jones Industrial Aver	DIA	Equity	Mar	2-7w, 3F x1, L x3, Q x4	5B	5B	10B	637M	0.36
iShares MSCI EAFE ETF	EFA	Equity	Mar	2-7w, 3F x1, L x3, Q x4	6B	14B	20B	534M	0.76
SPDR S&P Oil & Gas Exploration	XOP	Equity	Mar	1-7w, 3F x1, L x1	3B	6B	9B	355M	1.15
Financial Select Sector SPDR F	XLF	Equity	Mar	2-7w, 3F x1, L x2, Q x4	5B	5B	10B	342M	0.75
iShares MSCI Brazil Capped ETF	EWZ	Equity	Mar	1-7w, 3F x1, L x1	4B	6B	10B	322M	1.05
Energy Select Sector SPDR Fund	XLE	Equity	Mar	2-7w, 3F x1, L x2, Q x4	4B	5B	9B	317M	1.39
VanEck Vectors Gold Miners ETF	GDX	Equity	Mar	1-7w, 3F x1, L x2	3B	3B	6B	234M	0.99
iShares China Large-Cap ETF	FXI	Equity	Feb	1-7w, 3F x2, L x2	3B	6B	9B	197M	0.51
Utilities Select Sector SPDR F	XLU	Equity	Mar	1-7w, 3F x1, L x2	2B	3B	4B	196M	1.03
iShares U.S. Real Estate ETF	IYR	Equity	Mar	1-7w, 3F x1, L x2	2B	2B	4B	142M	0.67
Health Care Select Sector SPDR	XLV	Equity	Mar	1-7w, 3F x1, L x2	1B	1B	2B	98M	1.31
Technology Select Sector SPDR	XLK	Equity	Mar	1-7w, 3F x1, L x2	802M	2B	3B	97M	1.47
Industrial Select Sector SPDR	XLI	Equity	Mar	1-7w, 3F x1, L x2	655M	1B	2B	72M	0.92
iShares MSCI South Korea Cappe	EWY	Equity	Jan	1-7w, L x2	378M	1B	2B	62M	1.23
SPDR S&P Retail ETF	XRT	Equity	Mar	1-7w, 3F x1, L x1	431M	947M	1B	60M	2.84
Consumer Staples Select Sector	XLP	Equity	Mar	1-7w, 3F x1, L x2	409M	832M	1B	42M	1.09
WisdomTree Japan Hedged Equity	DXJ	Equity	Feb	1-7w, 3F x2, L x1	687M	791M	1B	39M	0.56
SPDR S&P MidCap 400 ETF Trust	MDY	Equity	Mar	1-7w, 3F x1, L x1	1B	682M	2B	38M	1.74
iShares MSCI Mexico Capped ETF	EWW	Equity	Mar	1-7w, 3F x1, L x1	309M	700M	1B	37M	0.48
Consumer Discretionary Select	XLY	Equity	Mar	1-7w, 3F x1, L x2	605M	1B	2B	37M	1.35
iShares MSCI Japan ETF	EWJ	Equity	Mar	1-7w, 3F x1, L x1	565M	1B	2B	35M	0.93
Materials Select Sector SPDR F	XLB	Equity	Mar	1-7w, 3F x1, L x2	440M	725M	1B	26M	1.69
SPDR EURO STOXX 50 ETF	FEZ	Equity	Feb	1-7w, 3F x2, L x1	620M	751M	1B	21M	0.89
SPDR S&P Metals & Mining ETF	XME	Equity	Mar	1-7w, 3F x1, L x1	377M	389M	766M	21M	1.67
VanEck Vectors Russia ETF	RSX	Equity	Feb	1-7w, 3F x1, L x1	286M	402M	688M	10M	1.48
WisdomTree India Earnings Fund	EPI	Equity	Jan	1-7w, L x2	179M	249M	427M	8M	2.73
SPDR S&P Homebuilders ETF	XHB	Equity	Mar	1-7w, 3F x1, L x1	231M	198M	429M	6M	1.20
iShares MSCI Taiwan Capped ETF	EWT	Equity	Mar	3F x1, L x1	24M	36M	60M	6M	1.19
WisdomTree Europe Hedged Equit	HEDJ	Equity	Feb	1-7w, 3F x1, L x1	142M	186M	328M	5M	1.34
iShares MSCI ACWI ETF	ACWI	Equity	Jan	L x2	222M	346M	568M	4M	2.11
iShares MSCI Germany ETF	EWG	Equity	Jan	1-7w, 3F x1, L x1	58M	101M	159M	2M	1.70
iShares MSCI United Kingdom ET	EWU	Equity	Jan	1-7w, 3F x1, L x1	15M	37M	52M	685k	1.58
iShares MSCI Hong Kong ETF	EWH	Equity	Mar	3F x1	8M	12M	19M	468k	3.06
iShares 20+ Year Treasury Bond	TLT	Fixed Income	Mar	1-7w, 3F x1, L x1	7B	7B	14B	860M	0.32
iShares iBoxx $ High Yield Cor	HYG	Fixed Income	Mar	1-7w, 3F x4, L x7	5B	16B	21B	671M	0.77
iShares iBoxx $ Investment Gra	LQD	Fixed Income	Mar	3F x1, L x1	1B	1B	3B	103M	0.41
iShares 7-10 Year Treasury Bon	IEF	Fixed Income	Mar	3F x1, L x2	776M	2B	2B	48M	0.65
iShares JP Morgan USD Emerging	EMB	Fixed Income	Mar	3F x1, L x1	173M	518M	691M	18M	1.00
SPDR Bloomberg Barclays High Y	JNK	Fixed Income	Mar	1-7w, 3F x1, L x1	92M	339M	431M	16M	1.99
iShares MBS ETF	MBB	Fixed Income	Mar		536k	557k	1M	127k	1.71
SPDR Gold Shares	GLD	Commodity	Mar	2-7w, 3F x2, L x3, Q x4	27B	13B	40B	2B	0.15
United States Oil Fund LP	USO	Commodity	Jan	1-7w, 3F x1, L x3	2B	2B	4B	134M	1.89
iShares Silver Trust	SLV	Commodity	Jan	2-7w, 3F x1, L x3, Q x4	2B	630M	3B	87M	0.63
United States Natural Gas Fund	UNG	Commodity	Jan	1-7w, L x2	296M	270M	565M	17M	3.32
PowerShares DB Agriculture Fun	DBA	Commodity	Jan	L x2	167M	94M	260M	7M	2.71
PowerShares DB Commodity Index	DBC	Commodity	Jan		27M	26M	53M	2M	6.50
CurrencyShares Euro Trust	FXE	FX	Mar	1-7w, 3F x1, L x1	2B	1B	3B	138M	0.23
PowerShares DB US Dollar Index	UUP	FX	Mar	1-7w, 3F x1, L x1	1B	207M	1B	32M	0.67

Source: BofA Merrill Lynch Global Research. Data as of 28-Sep-17. *At any given time, there are at least four different expiration months trading on a particular ETF. All ETFs will have options expiring on the 3rd Friday for at least the two near-term expiration months along with two months from their expiration quarterly cycle. For instance, as of 1-Jan an ETF with a Mar cycle will have options expiring in Jan, Feb, Mar, Jun. Recent exchange rules now allow for the listing of additional months beyond just four available expirations, so there are deviations from standard listing procedures. In this table we list additional 3rd Fri available expirations, as well as weeklies (=w), LEAPS (=L, i.e., options expiring >9m out), and quarterlies (=Q, i.e., options expiring the last trading day of Mar/Jun/Sep/Dec). **Avg. bid ask spread of the ATM straddle expiring on the third available expiry.

Listed options expiry schedules for 53 US domiciled ETFs

Chart 35: Charts shows all available listed expiries for 53 US domiciled ETFs



Source: BofA Merrill Lynch Global Research. Data as of 28-Sep-17.

Fund specifications and liquidity monitor for 53 US domiciled ETFs

Table 5: Table is ordered by asset class first, and within asset class by Net Assets

Description							Liquidity	
Security Name	Symbol	Asset Class	Geographical Focus	Net Assets ($ mn)	Market share of US domiciled ETF market	Expense Ratio	1m avg. notional volume	Bid/Ask spread (bps)
SPDR S&P500 ETF Trust	SPY	Equity	U.S.	241,728	7.7%	0.09%	17B	0.41
iShares MSCI EAFE ETF	EFA	Equity	Global	79,767	2.5%	0.33%	999M	1.47
PowerShares QQQ Trust Series 1	QQQ	Equity	U.S.	51,950	1.7%	0.20%	5B	0.70
iShares Russell 2000 ETF	IWM	Equity	U.S.	41,153	1.3%	0.20%	4B	0.71
iShares MSCI Emerging Markets	EEM	Equity	Global	35,665	1.1%	0.72%	2B	2.23
Financial Select Sector SPDR F	XLF	Equity	U.S.	27,220	0.9%	0.14%	1B	3.93
SPDR Dow Jones Industrial Aver	DIA	Equity	U.S.	18,660	0.6%	0.17%	531M	0.51
SPDR S&P MidCap 400 ETF Trust	MDY	Equity	U.S.	18,562	0.6%	0.25%	291M	1.19
Health Care Select Sector SPDR	XLV	Equity	U.S.	17,747	0.6%	0.14%	529M	1.24
Technology Select Sector SPDR	XLK	Equity	U.S.	17,724	0.6%	0.14%	519M	1.72
Energy Select Sector SPDR Fund	XLE	Equity	U.S.	16,510	0.5%	0.14%	860M	1.49
iShares MSCI Japan ETF	EWJ	Equity	Japan	15,913	0.5%	0.48%	297M	1.81
Consumer Discretionary Select	XLY	Equity	U.S.	11,509	0.4%	0.14%	376M	1.14
Industrial Select Sector SPDR	XLI	Equity	U.S.	10,927	0.3%	0.14%	598M	1.43
WisdomTree Europe Hedged Equit	HEDJ	Equity	Europe	8,953	0.3%	0.58%	65M	1.65
Consumer Staples Select Sector	XLP	Equity	U.S.	8,769	0.3%	0.14%	534M	1.85
WisdomTree Japan Hedged Equity	DXJ	Equity	Japan	8,180	0.3%	0.48%	133M	1.85
iShares MSCI ACWI ETF	ACWI	Equity	Global	7,847	0.2%	0.33%	99M	1.47
Utilities Select Sector SPDR F	XLU	Equity	U.S.	7,740	0.2%	0.14%	562M	1.89
VanEck Vectors Gold Miners ETF	GDX	Equity	Global	7,611	0.2%	0.52%	1B	4.29
iShares MSCI Brazil Capped ETF	EWZ	Equity	Brazil	6,917	0.2%	0.62%	701M	2.39
iShares MSCI Germany ETF	EWG	Equity	Germany	4,629	0.1%	0.48%	98M	3.14
iShares U.S. Real Estate ETF	IYR	Equity	U.S.	4,512	0.1%	0.43%	472M	1.29
SPDR EURO STOXX 50 ETF	FEZ	Equity	Eurozone	4,447	0.1%	0.29%	94M	2.46
Materials Select Sector SPDR F	XLB	Equity	U.S.	4,064	0.1%	0.14%	237M	1.79
iShares MSCI South Korea Cappe	EWY	Equity	South Korea	3,806	0.1%	0.62%	171M	1.49
iShares MSCI Taiwan Capped ETF	EWT	Equity	Taiwan	3,656	0.1%	0.62%	102M	2.77
iShares China Large-Cap ETF	FXI	Equity	China	3,470	0.1%	0.73%	508M	2.27
iShares MSCI United Kingdom ET	EWU	Equity	U.K.	2,629	0.1%	0.48%	61M	2.93
SPDR S&P Oil & Gas Exploration	XOP	Equity	U.S.	2,180	0.1%	0.35%	473M	3.01
VanEck Vectors Russia ETF	RSX	Equity	Russia	2,137	0.1%	0.62%	135M	4.55
iShares MSCI Hong Kong ETF	EWH	Equity	Hong Kong	1,845	0.1%	0.48%	73M	4.09
WisdomTree India Earnings Fund	EPI	Equity	India	1,646	0.1%	0.84%	44M	4.00
iShares MSCI Mexico Capped ETF	EWW	Equity	Mexico	1,280	0.0%	0.48%	102M	1.91
iPATH S&P 500 VIX Short-Term F	VXX	Equity	U.S.	1,059	0.0%	0.89%	1B	2.47
SPDR S&P Homebuilders ETF	XHB	Equity	U.S.	0,941	0.0%	0.35%	68M	2.64
SPDR S&P Metals & Mining ETF	XME	Equity	U.S.	0,767	0.0%	0.35%	75M	3.27
SPDR S&P Retail ETF	XRT	Equity	U.S.	0,361	0.0%	0.35%	147M	2.53
iShares iBoxx $ Investment Gra	LQD	Fixed Income	U.S.	37,485	1.2%	0.15%	639M	0.84
iShares iBoxx $ High Yield Cor	HYG	Fixed Income	U.S.	19,332	0.6%	0.50%	799M	1.14
SPDR Bloomberg Barclays High Y	JNK	Fixed Income	U.S.	12,815	0.4%	0.40%	279M	2.69
iShares JP Morgan USD Emerging	EMB	Fixed Income	Global	11,622	0.4%	0.40%	188M	1.03
iShares MBS ETF	MBB	Fixed Income	U.S.	11,042	0.4%	0.09%	45M	1.41
iShares 20+ Year Treasury Bond	TLT	Fixed Income	U.S.	9,516	0.3%	0.15%	1B	0.81
iShares 7-10 Year Treasury Bon	IEF	Fixed Income	U.S.	7,902	0.3%	0.15%	200M	0.99
SPDR Gold Shares	GLD	Commodity	Global	35,643	1.1%	0.40%	1B	0.82
iShares Silver Trust	SLV	Commodity	Global	5,517	0.2%	0.50%	117M	6.26
United States Oil Fund LP	USO	Commodity	U.S.	2,275	0.1%	0.72%	215M	9.65
PowerShares DB Commodity Index	DBC	Commodity	Global	1,945	0.1%	0.89%	20M	6.48
PowerShares DB Agriculture Fun	DBA	Commodity	Global	0,713	0.0%	0.89%	13M	5.72
United States Natural Gas Fund	UNG	Commodity	U.S.	0,515	0.0%	1.14%	38M	15.21
PowerShares DB US Dollar Index	UUP	FX	U.S.	0,645	0.0%	0.80%	31M	4.16
CurrencyShares Euro Trust	FXE	FX	Eurozone	0,323	0.0%	0.40%	76M	1.00

Source: BofA Merrill Lynch Global Research. Data as of 28-Sep-17.

Current volatility metrics relative to the past year for 53 US domiciled ETFs

Table 6: Table is ordered by asset class first, and within asset class by average daily notional option volume over the past 3m

Security Name	Symbol	Asset Class	3m 50Δ implied vol (A)	(A) 1-yr %-ile	1m realized vol (B)	Ratio (A/B = C)	(C) 1-yr %-ile	3m 25Δ skew* (D)	(D) 1-yr %-ile	1yr 50Δ implied vol	1yr-3m term structure** (E)	(E) 1yr %-ile
SPDR S&P500 ETF Trust	SPY	Equity	9.9%	18%	5.9%	1.7	64%	5.1%	51%	13.3%	3.4%	84%
PowerShares QQQ Trust Series 1	QQQ	Equity	14.6%	57%	10.2%	1.4	62%	5.5%	62%	16.7%	2.1%	40%
iShares Russell 2000 ETF	IWM	Equity	13.8%	6%	8.4%	1.6	95%	4.2%	4%	16.6%	2.8%	81%
iShares MSCI Emerging Markets	EEM	Equity	15.6%	29%	10.9%	1.4	81%	5.2%	81%	19.3%	3.7%	97%
iPATH S&P 500 VIX Short-Term F	VXX	Equity	94.6%	98%	42.5%	2.2	100%	-16.7%	100%	79.6%	-15.0%	1%
SPDR Dow Jones Industrial Aver	DIA	Equity	9.3%	6%	6.1%	1.5	35%	4.3%	24%	12.6%	3.3%	89%
iShares MSCI EAFE ETF	EFA	Equity	9.6%	0%	6.5%	1.5	52%	3.7%	10%	14.6%	4.9%	100%
SPDR S&P Oil & Gas Exploration	XOP	Equity	27.4%	10%	19.5%	1.4	87%	3.9%	46%	28.0%	0.5%	71%
Financial Select Sector SPDR F	XLF	Equity	15.2%	15%	13.1%	1.2	45%	3.4%	34%	17.7%	2.5%	90%
iShares MSCI Brazil Capped ETF	EWZ	Equity	27.0%	21%	18.0%	1.5	96%	6.2%	95%	29.5%	2.5%	84%
Energy Select Sector SPDR Fund	XLE	Equity	15.5%	4%	9.1%	1.7	98%	3.2%	21%	18.0%	2.5%	94%
VanEck Vectors Gold Miners ETF	GDX	Equity	25.5%	0%	24.9%	1.0	41%	0.0%	20%	30.4%	4.9%	100%
iShares China Large-Cap ETF	FXI	Equity	18.7%	64%	14.8%	1.3	67%	4.3%	94%	20.4%	1.7%	11%
Utilities Select Sector SPDR F	XLU	Equity	12.9%	43%	10.4%	1.2	57%	2.4%	44%	14.8%	1.9%	70%
iShares U.S. Real Estate ETF	IYR	Equity	12.5%	39%	9.2%	1.4	75%	3.2%	26%	14.2%	1.7%	56%
Health Care Select Sector SPDR	XLV	Equity	11.8%	33%	9.2%	1.3	41%	3.1%	56%	14.2%	2.4%	66%
Technology Select Sector SPDR	XLK	Equity	14.4%	61%	9.7%	1.5	69%	5.4%	76%	16.5%	2.1%	32%
Industrial Select Sector SPDR	XLI	Equity	11.6%	5%	7.6%	1.5	79%	3.1%	11%	14.1%	2.5%	51%
iShares MSCI South Korea Cappe	EWY	Equity	20.5%	81%	14.8%	1.4	96%	7.4%	96%	21.6%	1.1%	25%
SPDR S&P Retail ETF	XRT	Equity	18.9%	30%	12.9%	1.5	98%	5.4%	82%	20.7%	1.8%	82%
Consumer Staples Select Sector	XLP	Equity	10.5%	37%	8.0%	1.3	54%	2.8%	40%	12.4%	1.9%	57%
WisdomTree Japan Hedged Equity	DXJ	Equity	14.3%	15%	11.6%	1.2	39%	4.0%	80%	16.3%	2.0%	73%
SPDR S&P MidCap 400 ETF Trust	MDY	Equity	11.0%	1%	7.5%	1.5	88%	4.4%	23%	14.0%	3.0%	96%
iShares MSCI Mexico Capped ETF	EWW	Equity	19.0%	12%	13.4%	1.4	74%	5.1%	70%	22.0%	3.0%	90%
Consumer Discretionary Select	XLY	Equity	11.2%	8%	7.8%	1.4	56%	3.1%	28%	14.4%	3.2%	90%
iShares MSCI Japan ETF	EWJ	Equity	9.6%	1%	5.2%	1.8	72%	3.5%	80%	12.3%	2.7%	87%
Materials Select Sector SPDR F	XLB	Equity	12.8%	7%	8.5%	1.5	82%	3.1%	44%	16.0%	3.2%	85%
SPDR EURO STOXX 50 ETF	FEZ	Equity	12.6%	3%	8.7%	1.5	49%	4.1%	20%	16.3%	3.7%	99%
SPDR S&P Metals & Mining ETF	XME	Equity	22.6%	0%	15.9%	1.4	94%	3.1%	53%	25.9%	3.3%	80%
VanEck Vectors Russia ETF	RSX	Equity	20.0%	7%	14.1%	1.4	70%	3.9%	45%	23.2%	3.1%	81%
WisdomTree India Earnings Fund	EPI	Equity	18.2%	50%	15.0%	1.2	39%	3.4%	53%	20.6%	2.4%	56%
SPDR S&P Homebuilders ETF	XHB	Equity	14.3%	1%	10.8%	1.3	52%	4.7%	59%	16.5%	2.2%	48%
iShares MSCI Taiwan Capped ETF	EWT	Equity	17.4%	58%	11.9%	1.5	87%	4.4%	74%	18.3%	0.9%	14%
WisdomTree Europe Hedged Equit	HEDJ	Equity	12.8%	2%	8.8%	1.5	56%	4.3%	43%	16.2%	3.4%	97%
iShares MSCI ACWI ETF	ACWI	Equity	9.5%	8%	5.7%	1.7	52%	3.9%	61%	12.9%	3.5%	95%
iShares MSCI Germany ETF	EWG	Equity	12.5%	1%	9.9%	1.3	44%	4.0%	13%	15.5%	3.0%	89%
iShares MSCI United Kingdom ET	EWU	Equity	10.9%	10%	6.7%	1.6	56%	3.9%	57%	13.8%	2.9%	69%
iShares MSCI Hong Kong ETF	EWH	Equity	13.2%	31%	9.2%	1.4	61%	4.3%	79%	14.2%	1.0%	40%
iShares 20+ Year Treasury Bond	TLT	Fixed Income	10.3%	20%	10.1%	1.0	13%	-0.3%	6%	12.0%	1.7%	77%
iShares iBoxx $ High Yield Cor	HYG	Fixed Income	6.1%	16%	2.5%	2.5	81%	3.1%	90%	8.0%	1.9%	49%
iShares iBoxx $ Investment Gra	LQD	Fixed Income	4.7%	4%	4.0%	1.2	10%	0.6%	9%	5.9%	1.2%	98%
iShares 7-10 Year Treasury Bon	IEF	Fixed Income	5.1%	26%	4.5%	1.1	19%	0.0%	26%	5.8%	0.7%	73%
iShares JP Morgan USD Emerging	EMB	Fixed Income	6.3%	21%	3.9%	1.6	50%	2.2%	61%	7.3%	1.1%	67%
SPDR Bloomberg Barclays High Y	JNK	Fixed Income	5.9%	2%	2.5%	2.3	71%	1.9%	15%	8.4%	2.5%	74%
iShares MBS ETF	MBB	Fixed Income	3.5%	39%	2.1%	1.7	74%	0.6%	34%	3.6%	0.1%	22%
SPDR Gold Shares	GLD	Commodity	11.2%	5%	12.2%	0.9	0%	-0.9%	44%	13.2%	2.0%	48%
United States Oil Fund LP	USO	Commodity	28.5%	18%	25.7%	1.1	55%	2.9%	33%	28.2%	-0.4%	24%
iShares Silver Trust	SLV	Commodity	19.2%	8%	16.1%	1.2	60%	-1.8%	36%	22.1%	3.0%	47%
United States Natural Gas Fund	UNG	Commodity	41.0%	62%	28.3%	1.4	89%	-3.0%	20%	36.7%	-4.3%	1%
PowerShares DB Agriculture Fun	DBA	Commodity	15.7%	97%	11.0%	1.4	69%	-0.4%	87%	16.0%	0.2%	5%
PowerShares DB Commodity Index	DBC	Commodity	14.6%	1%	13.6%	1.1	12%	1.6%	71%	15.6%	1.0%	87%
CurrencyShares Euro Trust	FXE	FX	7.6%	22%	8.1%	0.9	20%	-0.2%	3%	7.9%	0.3%	51%
PowerShares DB US Dollar Index	UUP	FX	7.6%	37%	7.1%	1.1	11%	-0.5%	72%	7.9%	0.3%	59%

Source: BofA Merrill Lynch Global Research. Data as of 27-Sep -17. *3m 25Δ skew = 5-day MA of (25Δ put – 25Δ call). **1yr-3m term structure = 12m 50Δ - 3m 50Δ implied vol spread

Options' based sentiment indicator for 53 US domiciled ETFs

Table 7: The 10 most bearish: table ordered by highest average score across i) options put-call ratio (1yr %-ile), ii) 3m 50Δ implied / 1m realized vol (1yr %-ile), iii) skew (1yr %-ile), and iv) short interest (1yr %-ile)

Name	Ticker	Options put-call ratio (1yr %-ile)*	3m 50Δ implied / 1m realized vol (1-1yr %-ile)	Skew (1yr %-ile)**	Short Interest (1yr %-ile)†
SPDR Gold Shares	GLD	75%	100%	44%	96%
iShares MSCI Japan ETF	EWJ	97%	28%	80%	99%
PowerShares DB Agriculture Fun	DBA	89%	32%	87%	91%
SPDR S&P Homebuilders ETF	XHB	81%	48%	59%	93%
iShares MSCI Hong Kong ETF	EWH	75%	39%	79%	84%
PowerShares DB Commodity Index	DBC	83%	88%	71%	34%
iShares 7-10 Year Treasury Bon	IEF	78%	89%	23%	85%
Technology Select Sector SPDR	XLK	79%	31%	76%	78%
WisdomTree Japan Hedged Equity	DXJ	95%	61%	80%	25%
iShares iBoxx $ Investment Gra	LQD	70%	91%	12%	84%

Source: BofA Merrill Lynch Global Research. Daily data from 28-Sep-16 to 28-Sep-17. *1-yr %-ile is calculated off the latest 1m MA of the put-call ratio. **3m 25Δ skew = 5-day MA of (25Δ put – 25Δ call). † Short Interest = ratio of short Interest over shares outstanding

Table 8: The 10 most bullish: table ordered by highest average score across i) options put-call ratio (1yr %-ile), ii) 3m 50Δ implied / 1m realized vol (1yr %-ile), iii) skew (1yr %-ile), and iv) short interest (1yr %-ile)

Name	Ticker	Options put-call ratio (1yr %-ile)*	3m 50Δ implied / 1m realized vol (1-1yr %-ile)	Skew (1yr %-ile)**	Short Interest (1yr %-ile)†
Energy Select Sector SPDR Fund	XLE	37%	2%	21%	16%
Industrial Select Sector SPDR	XLI	72%	22%	11%	1%
iShares Russell 2000 ETF	IWM	86%	5%	4%	11%
iShares MBS ETF	MBB	46%	22%	38%	0%
United States Natural Gas Fund	UNG	25%	12%	20%	54%
CurrencyShares Euro Trust	FXE	23%	80%	3%	8%
Financial Select Sector SPDR F	XLF	32%	55%	34%	0%
Utilities Select Sector SPDR F	XLU	47%	43%	44%	2%
Materials Select Sector SPDR F	XLB	64%	18%	44%	12%
iShares MSCI Germany ETF	EWG	52%	56%	13%	17%

Source: BofA Merrill Lynch Global Research. Daily data from 28-Sep-16 to 28-Sep-17. *1-yr %-ile is calculated off the latest 1m MA of the put-call ratio. **3m 25Δ skew = 5-day MA of (25Δ put – 25Δ call). † Short Interest = ratio of short Interest over shares outstanding

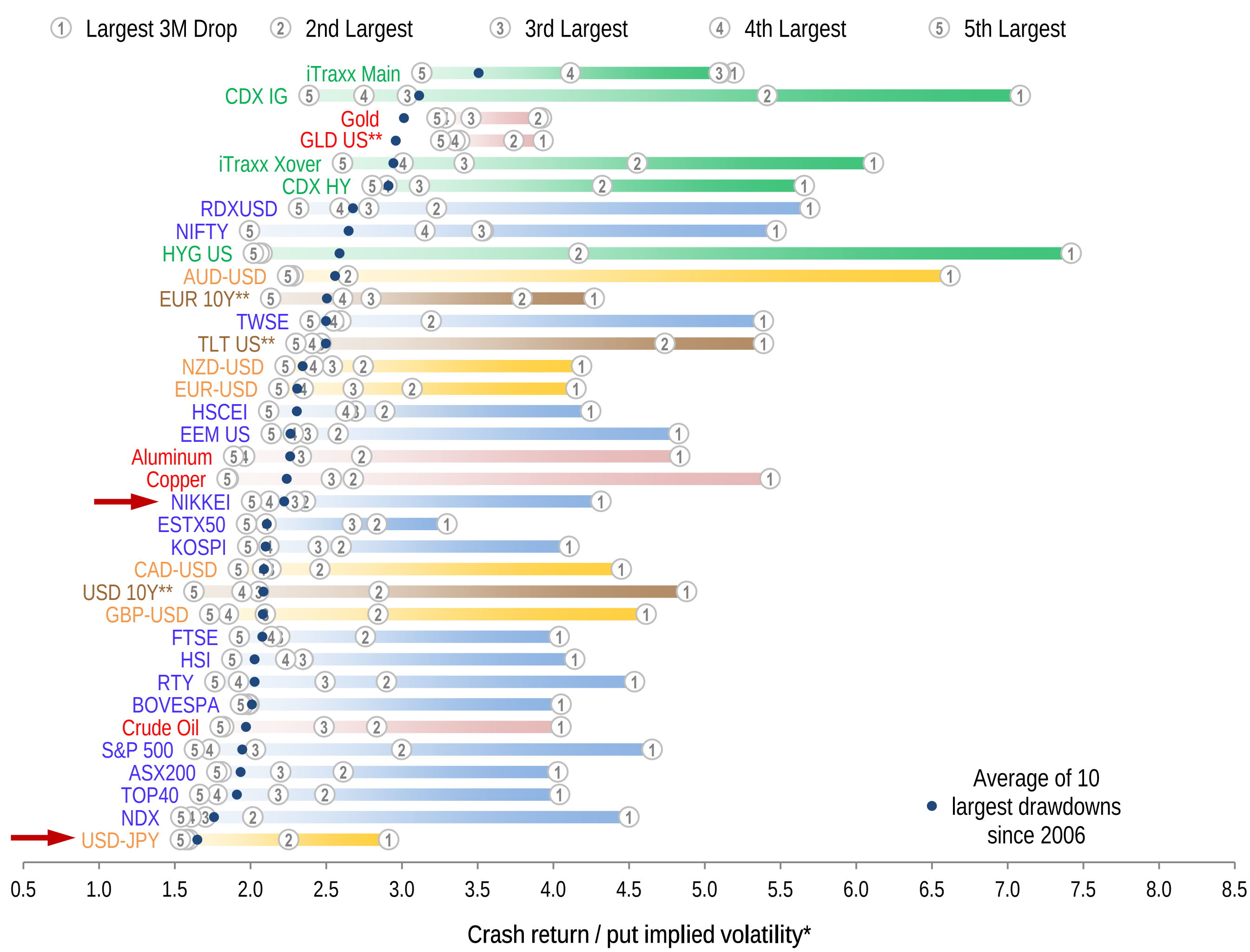
Identifying value in puts across asset classes

The chart below shows crash returns of different assets during historical tail events per unit of current OTM option implied volatility. We measure tail events by the 10 largest 3M drops since Jan-06. Ranked by the average, the screen shows that the hedges which are most underpricing historical drawdowns are: **US & EU IG credit payers, Gold calls** and **RDXUSD (Russian equity) puts**:

- **US & European IG credit payers** still rank as the best value hedges across all assets in our universe followed by **Gold (and Gold ETF) calls**.
- In equities, **RDXUSD (Russia), NIFTY (India)** and **TWSE (Taiwan)** puts screen as top hedges while **puts on NASDAQ (US Tech), Top40 (S. Africa)** and **ASX200 (Australia)** rank as the most expensive.
- **USDJPY puts** once more inhabit the far bottom of our screen (most expensive tail hedge) as the ongoing geopolitical risk flare on the Korean peninsula has likely increased demand for JPY as a risk-off asset. In contrast, **Nikkei puts**, while belonging to the same region, currently rank as the cheapest DM equity hedge.

Chart 36: Cross-asset tail hedging screen: EU & US IG Credit payers are currently most underpricing historical widening of spreads

For an explanation of how to interpret this chart see Finding cheap hedges: the framework.

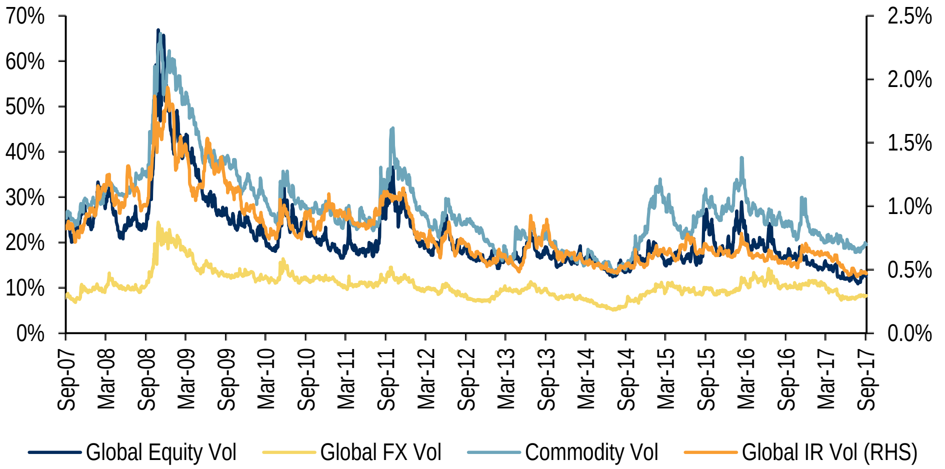


Source: BofA Merrill Lynch Global Research. Data: 4-Sep-17. *3M 25% delta put volatility for each asset, see Finding cheap hedges: the framework for more details on the methodology behind this diagram. **3M 25% delta call volatility (receiver premia) for TLT US (USD & EUR 10Y rates).

Global cross-asset volatility trends

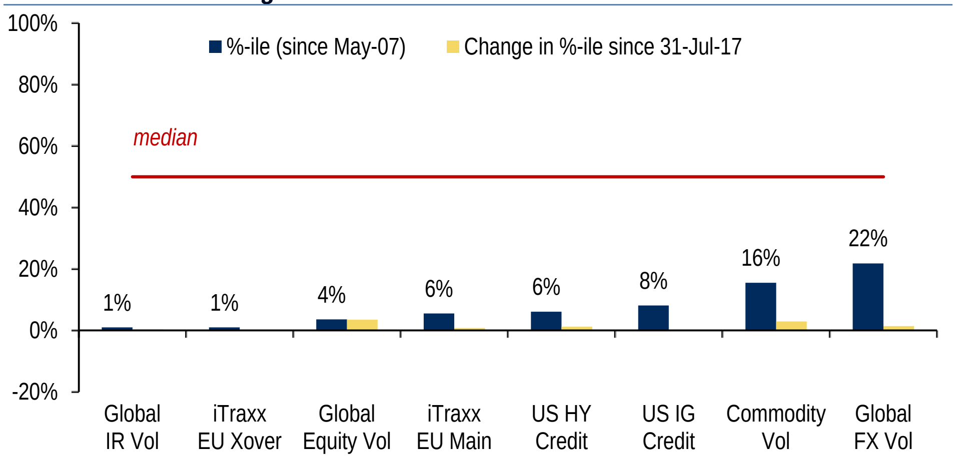
- All cross asset risk measures apart from EU IG credit spreads rose modestly over the month, yet remain in significantly benign territory
- Aug-17 marked the first time since Jan-16 when global equity, rates, commodity and FX vols all moved in the same direction

Chart 37: History of global cross-asset implied volatilities



Source: BofA Merrill Lynch Global Research (data from 1-Sep-07 to 4-Sep-17). 3M ATM implied vols on Equities (S&P500, ESTX50, FTSE 100, Nikkei 225, HSI), Interest Rates (Europe and US), FX (EUR/USD, USD/JPY, GBP/USD) and Commodities (Crude Oil, Gold and Copper).

Chart 38: Current %-iles of global cross-asset volatilities



Source: BofA Merrill Lynch Global Research (data as of 4-Sep-17). 3M ATM implied vols on Equities (S&P500, ESTX50, FTSE 100, Nikkei 225, HSI), Interest Rates (Europe and US), FX (EUR/USD, USD/JPY, GBP/USD) and Commodities (Crude Oil, Gold and Copper).

Summary of Open Trades (28-Sep-17)

Price data for open level reflects the price on open date and does not necessarily reflect the price at which the trade could be executed at the date of this report. Our trades are structured to be executed on the open date and are not necessarily appropriate to execute as formulated beyond that date.

Table 9: Summary of open trades as of 28-Sep-17

Trade Description	Open Date	Open Level	Expected Trade Term	Rationale
Buy EEM Oct 44 calls	14-Jul-17	$1.13	Oct-17	EM valuations are reasonable, earnings are coming up, currencies are inexpensive, financial vulnerability is at record lows and major central banks remain largely accommodative. However, with our investment strategists calling for the 'Big Top' this fall we prefer leveraging ultra-depressed EM equity implied volatility and using options to gain upside exposure
Buy EWW Sep 58-63 call spreads	14-Jul-17	$1.18	Oct-17	
Buy UUP Oct17 24 calls	14-Sep-17	$21c	Oct-17	
Buy SPY Dec17 256 calls & sell notional-equivalent EEM Dec17 48.0 calls	14-Sep-17	$0	Dec-17	Hedge a reversal of extreme underperformance of under owned USD-related assets and energy complex
Buy SPY Dec17 256 calls & sell notional-equivalent QQQ Dec17 152.0 calls	14-Sep-17	$0	Dec-17	
Buy XLE Dec17 68-71 call spreads	14-Sep-17	74c	Dec-17	

Summary of Closed Trades (28-Sep-17)

Table 10: Summary of closed trades as of 28-Sep-17

Trade Description	Open Date	Open Level	Close Level	Close Date	Rationale
Buy XLY Jan18 87 bullish risk reversal	10-Mar-17	-0.1%	0.7%	20-Mar-17	Risk-reward profile is less favourable today than at the start of the year; sector remains one of the most crowded sectors by fund managers, is most negatively impacted by rising wages given the labour intensity of its companies
Buy FXE Apr 103-100 put spreads	10-Mar-17	$0.57	$0	21-Apr-17	The FXE put spreads expired OTM as stalling progress on the tax reform failed to propel USD higher and investors discounted little risk ahead of the French election.
Buy RSX Jan18 20 bullish risk reversal	10-Mar-17	-2.6%	-4.4%	9-Jun-17	Our investment strategists are no longer OW Russia
Buy USO May 11-12 call spreads	10-Mar-17	$0.19	$0.0	19-May-17	Trade expired
Buy GDX May 22-24 call spreads	10-Mar-17	$0.66	$0.86	19-May-17	Trade expired
Buy IWM May136-140 call spreads	10-Mar-17	$1.81	$0.03	19-May-17	Trade expired
Buy DXJ May 50-52 call spreads	7-Apr-17	$0.89	$1.35	19-May-17	Trade expired
Buy XOP Jun 37-39 call spreads	7-Apr-17	$0.91	$0.0	16-Jun-17	Trade expired
Buy TLT Jun 120-115 put spreads	7-Apr-17	$1.68	$0.0	16-Jun-17	Trade expired
Buy GLD Jun120-125 call spreads	7-Apr-17	$1.62	$0.0	16-Jun-17	Trade expired
Buy XOP Jul 37-40 call spreads	15-May-17	$0.73	$0.0	211-Jul-17	Trade expired
Buy IWM Jan18 136 bullish	10-Mar-17	-0.7%	-0.1%	10-Aug-17	Small caps usually lag during Fed tightening cycles. Have become more reasonably valued vs. large caps but our strategists now prefer large.
Buy SLV Aug 14-16-17.5 call spread collars	15-May-17	$0.25	$0.1	18-Aug-17	Trade expired
Buy XLE Jan18 70 bullish risk reversal	10-Mar-17	-0.4%	-7.9%	13-Sep-17	Our investment strategists are no longer OW Energy
Buy XLP Jan18 55 bearish risk reversal	10-Mar-17	2.0%	0.7%	13-Sep-17	Our investment strategists are no longer UW Staples
Buy IWM Jan18 136 bullish risk reversal	10-Mar-17	-0.7%	3.6%	14-Sep-17	Small caps usually lag during Fed tightening cycles. Have become more reasonably valued vs. large caps but we still prefer large.
Buy EEM Sep 37-40-43 put spread collars	15-May-17	$0.00	-$2.59	15-Sep-17	Trade expired
Buy 1x QQQ Sep 141 call and sell 2x Sep 146 calls	9-Jun-17	$0.96	$4.7406	15-Sep-17	Trade expired
Buy XLF Sep 25 calls	9-Jun-17	$0.45	-$0.23	15-Sep-17	Trade expired
Buy EFA Sep 67-70 call spreads	9-Jun-17	$0.73	$1.06	15-Sep-17	Trade expired
Buy XME Sep 32-36 call spreads	9-Jun-17	$0.72	-$0.1	15-Sep-17	Trade expired
Buy EWZ Sep17 37.5 call and sell Jan18 45 call	14-Jul-17	$0.89	$5.85	15-Sep-17	Trade expired
Buy GLD Sep17 130 calls	11-Aug-17	35c	$0	15-Sep-17	Trade expired
Buy 1x GDX Sep17 24.5 calls & sell 0.5x Jun18 34.0 calls	11-Aug-17	14.5c	$0	15-Sep-17	Trade expired
Buy GLD Sep17 130 calls & sell IYR Sep17 83 calls	11-Aug-17	26c	$0	15-Sep-17	Trade expired
Buy SPY Jan18 238 bearish risk reversal	10-Mar-17	1.0%	-5%	28-Sep-17	
Buy EEM Jan18 38 bearish risk reversal	10-Mar-17	1.2	-14.5%	28-Sep-17	
Buy FXI Jan18 38 bullish risk reversal	10-Mar-17	-2.1%	11.7%	28-Sep-17	
Buy EWY Jan18 58 bullish risk reversal	10-Mar-17	0.7%	13.3%	28-Sep-17	
Buy EWT Jan18 32 bullish risk reversal	10-Mar-17	0.3%	9.6%	28-Sep-17	

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Potential Risk at Expiry & Options Limited Duration Risk

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Coverage Universe	Count	Percent	Inv. Banking Relationships*	Count	Percent
Buy	125	49.21%	Buy	98	78.40%
Hold	63	24.80%	Hold	43	68.25%
Sell	66	25.98%	Sell	34	51.52%

Equity Investment Rating Distribution: Global Group (as of 30 Jun 2017)

Coverage Universe	Count	Percent	Inv. Banking Relationships*	Count	Percent
Buy	1550	51.41%	Buy	980	63.23%
Hold	674	22.35%	Hold	410	60.83%
Sell	791	26.24%	Sell	388	49.05%

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster*
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