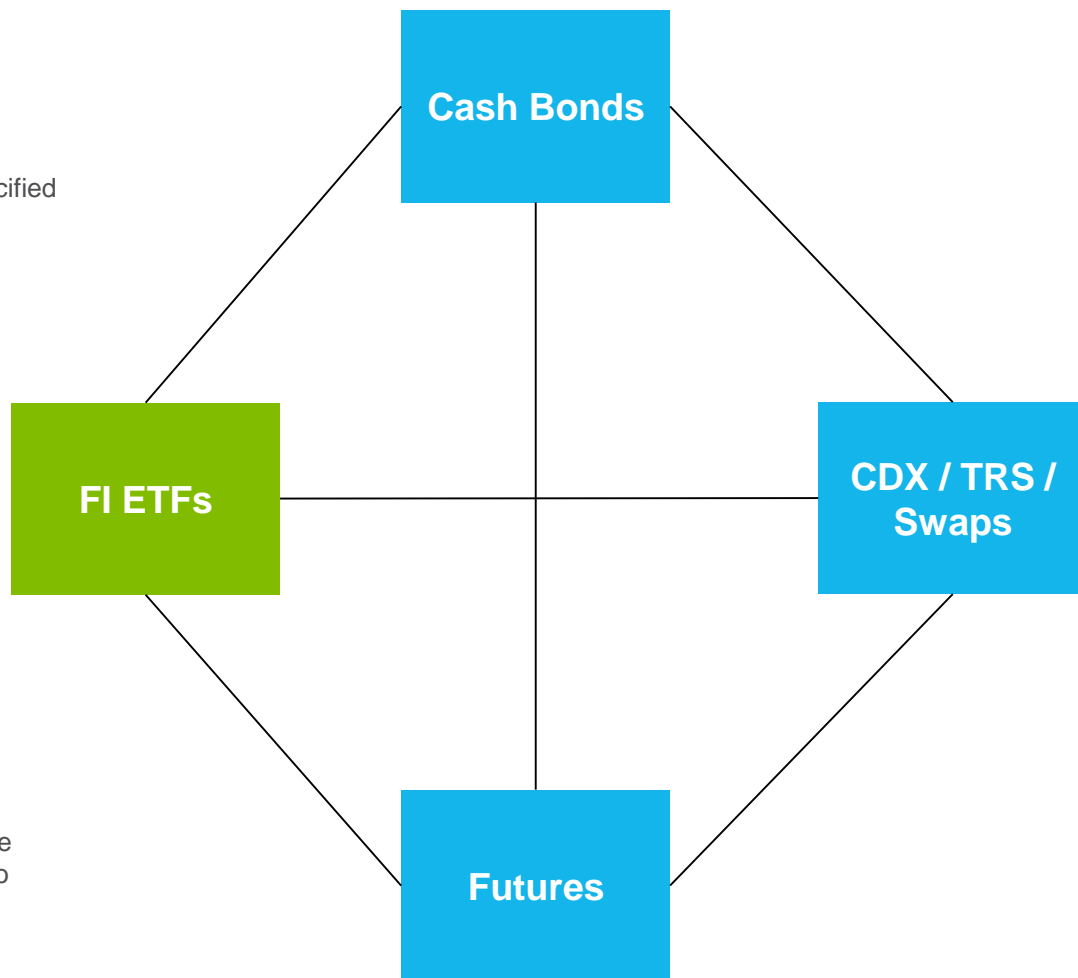


# Assessing Relative Value Across Fixed Income Instruments

- **Single Name Cash Bonds:**
  - High degree of flexibility
  - Higher cost and discontinuous liquidity
- **Exchange Traded Funds (ETFs):**
  - Exchange traded bond portfolios that seek to track specified indices (e.g., Markit iBoxx)
  - Possible higher levels of correlation with cash markets relative to CDS/CDX<sup>1</sup>
  - Increasing liquidity, mainly in credit products<sup>2</sup>
- **Credit Default Index Swaps (CDX):**
  - Most liquid and actively traded credit products
  - Spread exposure
  - Significant basis volatility
- **Index Total Return Swaps (TRS):**
  - OTC swap products designed to pay the total return on specified credit indices (e.g., Markit iBoxx)
  - Low levels of liquidity and high transaction costs
- **Futures**
  - Liquid futures generally limited to interest rate exposure (Treasuries, Eurodollars). CBOE has launched portfolio holding index futures on HYG & LQD



Source: Bloomberg, BlackRock

1. From 02/30/2013 to 12/30/2018, the correlation between Bloomberg Barclays Corporate Bond Index and IG CDX was 0.60, and 0.97 between NAV return of LQD (iShares iBoxx \$ Investment Grade Corporate Bond ETF). Likewise the correlation between Barclays High Yield Index and HY CDX was 0.62, and 0.88 between NAV return of HYG (iShares iBoxx \$ High Yield Corporate Bond ETF).

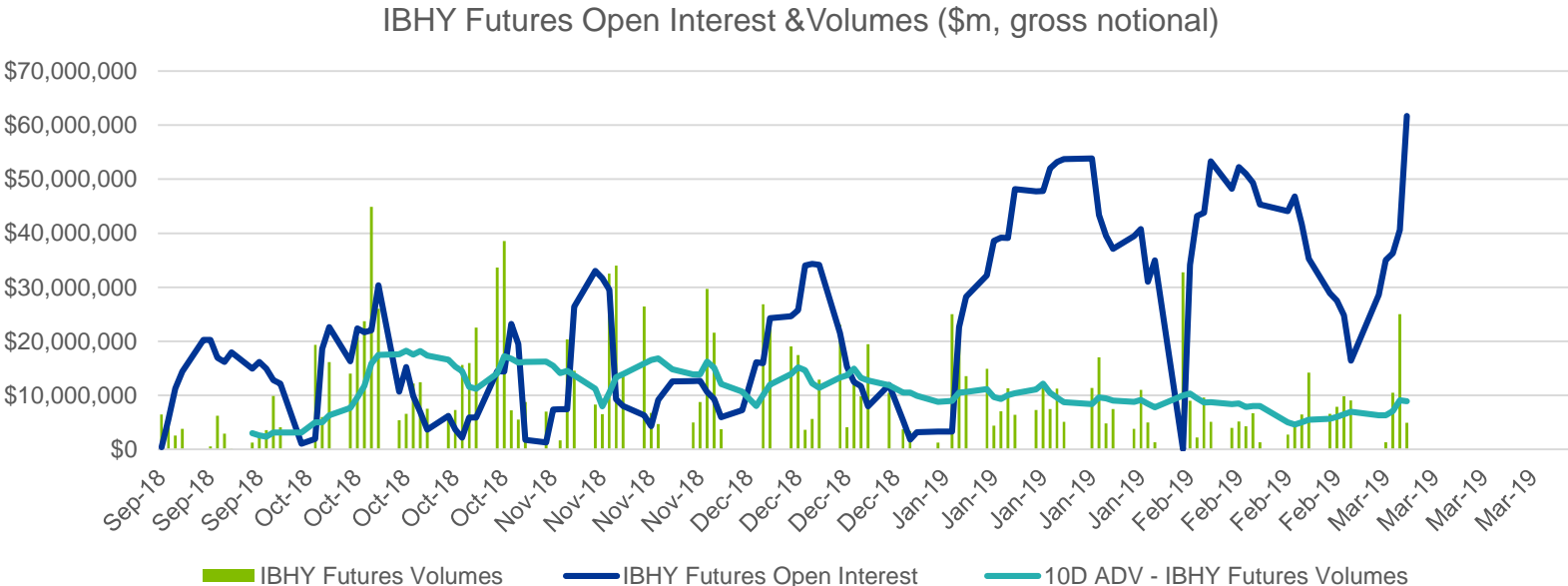
2. Between January 2007 and December 2018, the average trading volume of US Credit HY and IG ETFs grew from \$21M to \$3.7B.

**Past performance does not guarantee future results.**

# IBHY / IBIG Futures: Update On Activity Since Sept-18 Launch

- IBHY Futures are now up to \$60m open interest (gross notional), an all time high. IBIG futures activity has been muted – still no open interest.
- IBHY Futures trading has been sporadic since launch, but slowly growing, averaging \$10m of volumes per day (see below). Since launch, i) at least one contract has traded on 94% of the sessions , ii) >\$5m of volumes on 68% of the sessions; iii) >\$10m on 38% of the sessions.
- From September to December 2018, investors appeared to close majority of positions at month end expiration (as opposed to rolling into next contract). However, March 2019 saw the most roll activity of any month since inception which is a encouraging for investor adoption.

IBHY Open Interest and Trading Volumes since launch



Source: Bloomberg, BlackRock, as of 03/08/2019.

# CBOE iBoxx iShares \$ Corporate Bond Index Futures

- In 2018, CBOE launched futures on indices tethered to the holdings of HYG (IBXXIBHY) and LQD (IBXXIBIG)
- These contracts expire and roll monthly, are settled at the index NAV and also have an ECRP mechanism
- The prices of these contracts provide visibility into the underlying borrow markets for the HYG & LQD ETFs and allow for comparisons to iBoxx TRS and options.

Because the CBOE futures contracts are on index levels, the carry argument is as follows:

$$F = S(1 + (r - b - y)d/360)$$

Where,

F = Forward

S = Spot

r = money market rate

b = borrow rate

y = assumed dividend yield of ETF

d = days to futures expiration

Assume the following for IBYJP (CBOE HYG futures contract expiring 4/1/2019):

$$F = 129.23$$

$$S = 128.9257$$

$$r = 2.485\%$$

$$y = 5.35\%$$

$$d = 23$$

We can solve for  $b = (((F/S)-1)/(d/360)-r)/-1$

$$b = (((129.23/128.9257)-1)/(23/360)-2.485\%)/-1 = -1.20\%$$

Source: BlackRock, Bloomberg, as of 3/7/2019. Shown for illustrative purposes only.

# CBOE iBoxx iShares \$ Corporate Bond Index Futures

- We can now make comparisons in implied borrow across futures, iBoxx TRS and the options market.
- Using ATM options, we can imply borrow rates from synthetic longs (long call / short put) and synthetic shorts (long put / short call)

## HYG Listed Options April 18, 2019 Expiration

18-Apr-19 (42d); CSize 100; IDiv .51 USD; R 2.51; 5 +										18-Apr-19 (42d); CSize 100; IDiv .51 USD; R 2.51									
6) HYG 4/18/19 C83	2.31	2.44	2.48y	1.00		28	83.00	56) HYG 4/18/19 P83	.21	.28	.25	7.99	-.19	17					
7) HYG 4/18/19 C84	1.48	1.55	1.59y	6.14	.83	13	84.00	57) HYG 4/18/19 P84	.36	.43	.39	6.83	-.31	2157					
8) HYG 4/18/19 C85	.67	.76	.71	5.27	.61	7731	85.00	58) HYG 4/18/19 P85	.65	.67	.71	5.56	-.52	13579					
9) HYG 4/18/19 C86	.18	.20	.22	4.46	.27	608158	86.00	59) HYG 4/18/19 P86	1.18	1.31	1.24	4.73	-.80	752					
10) HYG 4/18/19 C87	.01	.09	.05y	4.77	.08	75	87.00	60) HYG 4/18/19 P87	2.05	2.18	2.12	3.99	-.98	44					

Source: Bloomberg as of March 7, 2019

## IBYJ9 Future (expiration 4/1/19)

	Short	Long
Quoted Futures Px	129.20	129.23
Spot	128.93	128.93
Expiration	0.06	0.06
1ML (cash rate)	2.49%	2.49%
All-in Rate	-0.84%	-1.20%

Source: Bloomberg as of March 7, 2019

## Implied Borrow Rates

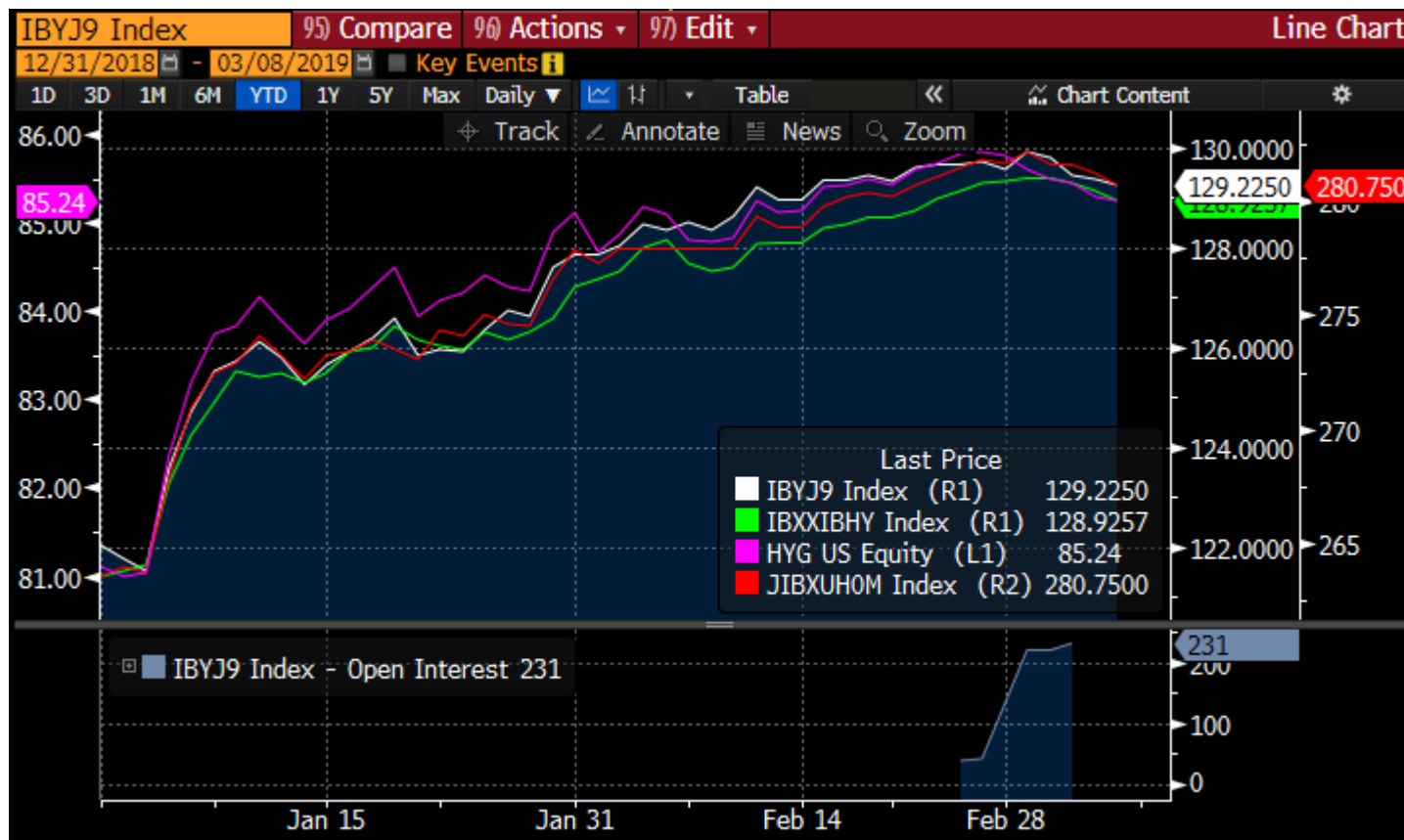
	Short	Long
IBYJ9 April	-0.84%	-1.20%
iBoxx HY TRS June	-0.25%	0.67%
April 85 Strike Syn Fwd	0.70%	-2.15%

Source: Bloomberg as of March 7, 2019

Source: BlackRock, Bloomberg, as of 3/7/2019. Shown for illustrative purposes only.

# CBOE iBoxx iShares \$ Corporate Bond Index Futures

- CBOE high yield index futures track closely to the IBXXIBHY index, HYG, and iBoxx TRS



Source: Bloomberg as of March 8, 2019. Past performance does not guarantee future results. For standardized performance, see the end of this document.

# Comparing Options on Credit ETFs with CDX Swaptions

- Figure 1 provides a time series on implied CDX and HYG spread volatility
- HYG implied spread volatility does appear to move directionally with CDX implied volatility.

Figure 1. HYG v CDX.HY Implied Spread Volatility

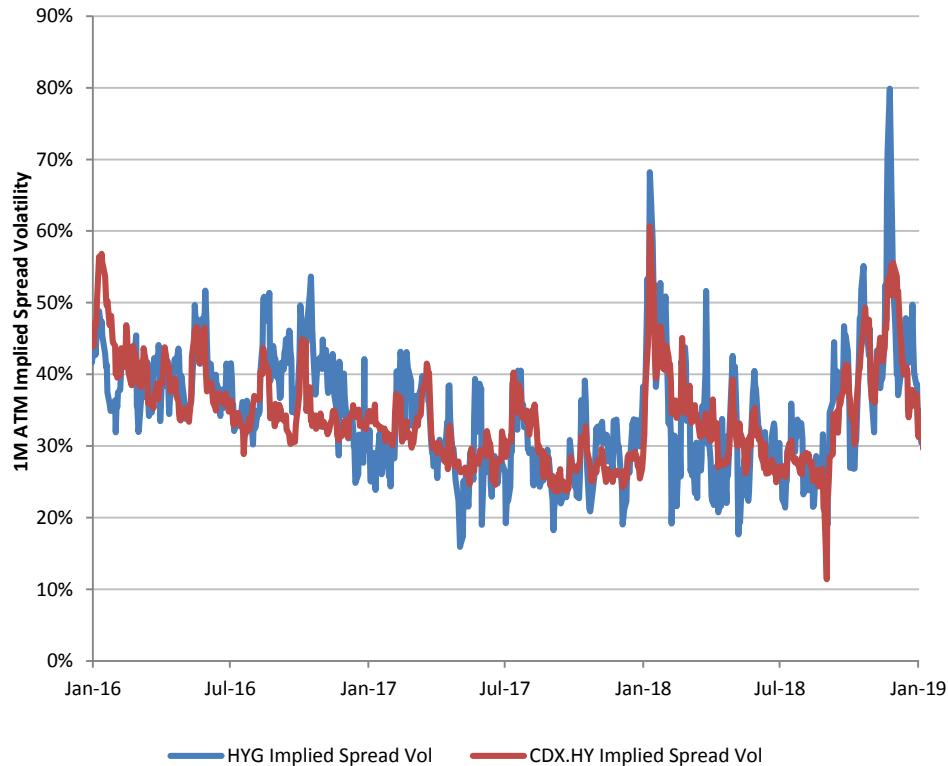
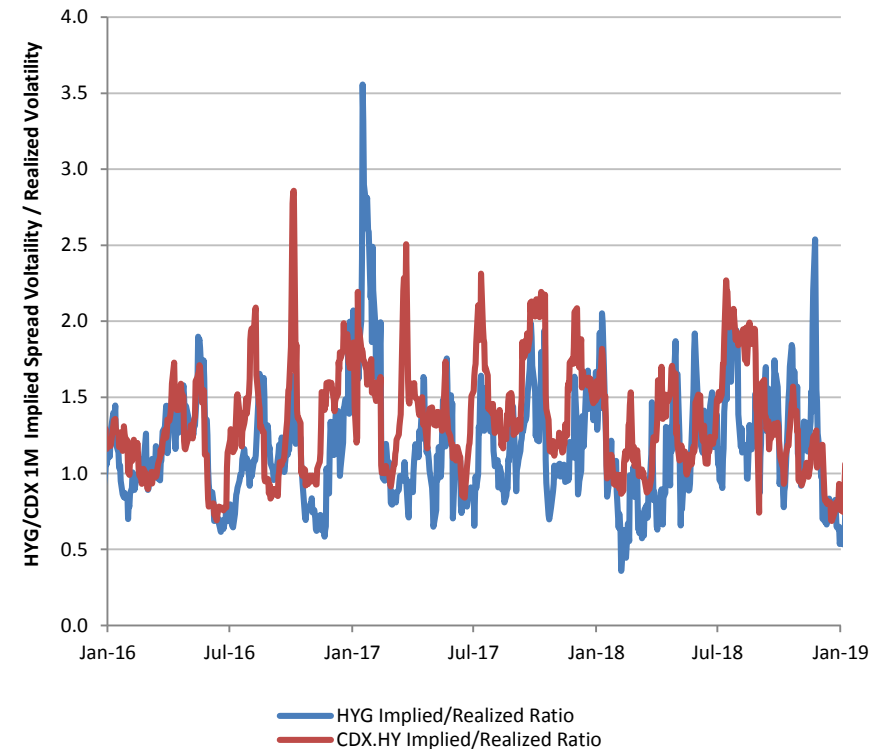


Figure 1. HYG & CDX.HY Implied vs. Realized Volatility



Source: BlackRock, Bloomberg, as of 1/31/2019. For a more detailed overview of US FI ETF Options, please see our July 2017 Paper "Understanding FI ETF Options."

## Standardized Performance as of 12/31/18

Fees as of Current Prospectus. All Other Data as of 12/31/18	Fund Inception Date	Gross Expense Ratio	30-Day SEC Yield (With / Without Waiver)	Contractual Fee Waiver Expiration (If Applicable)	1-Year	5-Year	10-Year	Since Inception
iShares iBoxx \$ High Yield Corporate Bond ETF	4/4/2007	0.49%	6.89%	--				
Fund NAV Total Return					-1.93%	2.69%	8.68%	4.95%
Fund Market Price Total Return					-1.99%	2.67%	7.55%	4.91%

**The performance quoted represents past performance and does not guarantee future results. Investment return and principal value of an investment will fluctuate so that an investor's shares, when sold or redeemed, may be worth more or less than the original cost. Current performance may be lower or higher than the performance quoted. Performance data current to the most recent month end may be obtained by visiting [www.iShares.com](http://www.iShares.com) or [www.blackrock.com](http://www.blackrock.com).**

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