

Price to NAV discount in ETFs during the Coronavirus market crash: an exploitable inefficiency?

BSAMC, Research, Market Insights

Authors

Nicola Calzà, Head of Market Insights, Research

Efecan Bahcivanoglu, Team Leader, Market Insights, Research

Zoe Chengran Mei, Analyst, Market Insights, Research

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Abstract

Over the course of the recent market crash driven by the Coronavirus epidemic, a range of ETFs have experienced a sharp price discount to the NAV. The analysis starts with a review of a panel of ETFs hit by the phenomenon and provides a tentative explanation of the latter. Possible ways to exploit the apparent inefficiency are examined.

1. Dimensions and features of the phenomenon

1.1 An overall picture

March 2020 has been a nightmare for financial markets, mainly influenced by the panic and uncertainty

| ETF | Ticker | Max. P/NAV Discount in 03/2020 (%) | Rank |
|--|--------|------------------------------------|------|
| VanEck Vectors High-Yield Municipal Index ETF | HYD | -27.90 | 1 |
| Invesco Variable Rate Preferred ETF | VRP | -25.20 | 2 |
| Invesco Taxable Municipal Bond ETF | BAB | -17.10 | 3 |
| VanEck Vectors AMT-Free Intermediate Municipal Index ETF | ITM | -16.50 | 4 |
| Invesco National AMT-Free Municipal Bond ETF | PZA | -12.80 | 5 |
| Invesco Emerging Markets Sovereign Debt ETF | PCY | -12.69 | 6 |
| SPDR Bloomberg Barclays Investment Grade Floating Rate ETF | FLRN | -12.25 | 7 |
| SPDR Portfolio Mortgage Backed Bond ETF | SPMB | -11.52 | 8 |
| iShares Floating Rate Bond ETF | FLOT | -10.80 | 9 |
| VanEck Vectors Fallen Angel High Yield Bond ETF | ANGL | -10.30 | 10 |

related to Coronavirus around the world.

Figure 1 – A panel of 10 ETFs ranked by largest P/NAV discount during March 2020 (synthetic version)

Specifically, going back to what happened on March 18th, global financial markets had their worst day in 30 years, with DOW, S&P, and NASDAQ achieving a performance of -12.93%, -11.98% and -12.32%, respectively. It was also the day during which the number of Coronavirus cases outside of China surpassed those inside China. By zooming in our views into the ETF market, we observed astonishing gaps between ETF prices and NAVs happening in many ETF segments.

The above table (Figure 1) is a synthetic version of the table provided below (Figure 2 – divided into four parts, comprising a list of 10 ETF with AuM higher than USD 1 Billion, ranked by the largest price to NAV discount experienced during March 2020 (most of them happened on March 18th).

Part 1/4

| Rank | Ticker | ETF Name | ISIN | Benchmark | Currency |
|------|--------|--|--------------|--|----------|
| 1 | HYD | VanEck Vectors High-Yield Municipal Index ETF | US92189H4092 | Bloomberg Barclays Municipal Custom High Yield Composite | USD |
| 2 | VRP | Invesco Variable Rate Preferred ETF | US46138G8704 | Wells Fargo Hybrid and Preferred Securities Floating and Variable Rate Index | USD |
| 3 | BAB | Invesco Taxable Municipal Bond ETF | GB0009697037 | BofA Merrill Lynch US Taxable Municipal Securities Plus Index | USD |
| 4 | ITM | VanEck Vectors AMT-Free Intermediate Municipal Index ETF | GB00B0130H42 | Bloomberg Barclays AMT-Free Intermediate Continuous Municipal Index | USD |
| 5 | PZA | Invesco National AMT-Free Municipal Bond ETF | GB00B0130H42 | ICE BofAML National Long-Term Core Plus Municipal Securities Index | USD |
| 6 | PCY | Invesco Emerging Markets Sovereign Debt ETF | US46138E7849 | DB Emerging Market USD Liquid Balanced Index | USD |
| 7 | FLRN | SPDR Bloomberg Barclays Investment Grade Floating Rate ETF | US78468R2004 | Bloomberg Barclays U.S. Floating Rate Note < 5 Years Index | USD |
| 8 | SPMB | SPDR Portfolio Mortgage Backed Bond ETF | US78464A3831 | Bloomberg Barclays U.S. MBS Index | USD |
| 9 | FLOT | iShares Floating Rate Bond ETF | US46429B6552 | Bloomberg Barclays U.S. Floating Rate Note < 5 Years Index | USD |
| 10 | ANGL | VanEck Vectors Fallen Angel High Yield Bond ETF | US92189F4375 | The BofA Merrill Lynch US Fallen Angel High Yield Index | USD |

Part 2/4

| Rank | Ticker | Asset class | Top issuing category (name) | Top issuing category (%) | Top issuing sub-category (name) | Top issuing sub-category (%) | Top rating (name) | Top rating (%) |
|------|--------|---------------------------|-----------------------------|--------------------------|---------------------------------|------------------------------|-------------------|----------------|
| 1 | HYD | Bonds | Municipal | 100,00% | Healthcare | 22,00% | BBB | 27,63% |
| 2 | VRP | Hybrid / Preferred Stocks | Corporate | 100,00% | Financial | 81,83% | BBB | 62,89% |
| 3 | BAB | Bonds | Municipal | 100,00% | Local authorities | 38,15% | AA | 62,73% |
| 4 | ITM | Bonds | Municipal | 100,00% | State | 19,70% | AA | 54,80% |
| 5 | PZA | Bonds | Municipal | 100,00% | Revenue | 45,32% | AA | 64,06% |
| 6 | PCY | Bonds | Government | 100,00% | Government | 100,00% | BBB | 26,20% |
| 7 | FLRN | Bonds | Corporate | 85,13% | Financial | 57,40% | A | 50,18% |
| 8 | SPMB | Bonds | Securitized | 100,00% | MBS | 100,00% | AAA | 100,00% |
| 9 | FLOT | Bonds | Corporate | 75,92% | Financial | 59,35% | A | 49,94% |
| 10 | ANGL | Bonds | Corporate | 100,00% | Communications | 17,30% | N.a. | N.a. |

Part 3/4

| Rank | Ticker | Top geography (name) | Top geography (%) | AuM (in USD bln) | Expense ratio (%) | Duration (years) | YTM (%) | Number of holdings |
|------|--------|----------------------|-------------------|------------------|-------------------|------------------|---------|--------------------|
| 1 | HYD | United States | 100,00% | 2,79 | 0,35% | 11,22 | 5,86% | 1887 |
| 2 | VRP | United States | 92,52% | 1,43 | 0,50% | 2,54 | N.a. | 240 |
| 3 | BAB | United States | 100,00% | 1,33 | 0,28% | 9,64 | 3,37% | 323 |
| 4 | ITM | United States | 100,00% | 1,62 | 0,24% | 6,07 | 2,51% | 2927 |
| 5 | PZA | United States | 100,00% | 1,96 | 0,28% | 6,26 | 3,63% | 435 |
| 6 | PCY | Poland | 3,23% | 2,67 | 0,50% | 9,19 | 6,76% | 109 |
| 7 | FLRN | United States | 62,49% | 2,76 | 0,15% | 0,1 | 2,09% | 581 |
| 8 | SPMB | United States | 100,00% | 1,92 | 0,06% | 3,37 | 2,62% | 937 |
| 9 | FLOT | United States | 65,87% | 7,36 | 0,20% | 0,09 | 2,09% | 592 |
| 10 | ANGL | United States | 82,68% | 1,69 | 0,35% | 5,75 | 5,28% | 238 |

Part 4/4

| Rank | Ticker | Max. (03/20) P/NAV discount (%) | Current (30/04/20) P/NAV discount (%) | Median (TTM) P/NAV discount (%) | Max. (03/20) Spread (%) | Current (30/04/20) Spread (%) | Median (TTM) Spread (%) |
|------|--------|---------------------------------|---------------------------------------|---------------------------------|-------------------------|-------------------------------|-------------------------|
| 1 | HYD | -27,90% | -2,50% | 0,03% (premium) | 0,70% | 0,10% | 0,05% |
| 2 | VRP | -25,20% | -0,30% | -0,02% | 1,60% | 0,30% | 0,10% |
| 3 | BAB | -17,10% | -0,40% | 0,32% (premium) | 0,50% | 0,10% | 0,05% |
| 4 | ITM | -16,50% | -2,00% | -0,06% | 1,60% | 0,10% | 0,05% |
| 5 | PZA | -12,80% | -0,50% | 0,08% (premium) | 0,70% | 0,10% | 0,05% |
| 6 | PCY | -12,69% | 2,67% (premium) | -0,08% | 0,41% | 0,04% | 0,03% |
| 7 | FLRN | -12,25% | -0,07% | 0,01% (premium) | 0,41% | 0,06% | 0,03% |
| 8 | SPMB | -11,52% | 0,11% (premium) | 0,09% (premium) | 0,26% | 0,10% | 0,09% |
| 9 | FLOT | -10,80% | -0,05% | 0,02% (premium) | 0,28% | 0,02% | 0,02% |
| 10 | ANGL | -10,30% | 1,30% (premium) | 0,29% (premium) | 0,60% | 0,10% | 0,17% |

Figure 2 – A panel of 10 ETFs ranked by largest P/NAV discount during March 2020 (complete version)

As previously said, here above is provided the complete version of the table (divided into four parts), which includes all the main data of each ETF (asset class, issuing category and sub-category, rating, geography, AuM, expense ratio, duration, YTM, number of holdings, stats about discounts and spreads – maximum during March 2020, current and TTM median), always ranked by the largest price to NAV discount experienced during March 2020.

First of all, we can notice that, except for VRP, which is a fund concentrated on hybrid instruments, all other ETFs are involved within the High Yield space, especially Municipal, in the USA.

1.2 A specific focus on the top 3 ETFs ranked by discount

To understand what caused this abnormal phenomenon in the ETF markets, we then analyzed in-depth the top three ETFs listed above. Then, with the understanding of the structure and mechanism underlying ETF markets, we would address the potential arbitrage opportunities that seem existed, taking into account the role of the phenomenon, financial regulation, and market rebalance after panic time. Here below is provided a brief recap of the top 10 contributors of the top 3 ETFs seen before (namely, HYD, VRP, BAB).

| Top 10 Contributors - HYD | |
|--|-------------------|
| Issuer Name | Weight (%) |
| Chicago Ill Brd Ed | 3.27 |
| Puerto Rico Sales Tax Fing Corp Sales Tax Rev | 2.92 |
| Illinois St | 2.90 |
| New Jersey St Transn Tr Fd Auth | 2.73 |
| Chicago Ill | 2.11 |
| Golden St Tob Securitization Corp Calif Tob Settlement Rev | 2.07 |
| New Jersey Economic Dev Auth Rev | 2.03 |
| Illinois Fin Auth Rev | 1.60 |
| California Statewide Cmntys Dev Auth Rev | 1.59 |
| Florida Dev Fin Corp Surface Transn Fac Rev | 1.59 |
| Top 10 Total | 22.81 |

| Top 10 Contributors - VRP | |
|----------------------------------|-------------------|
| Issuer Name | Weight (%) |
| General Electric Co | 2.84 |
| JPMorgan Chase & Co | 1.66 |
| JPMorgan Chase & Co | 1.58 |
| Bank of America Corp | 1.52 |
| Wachovia Capital Trust III | 1.49 |
| Citigroup Inc | 1.43 |
| Ally Financial Inc | 1.35 |
| JPMorgan Chase & Co | 1.34 |
| JPMorgan Chase & Co | 1.31 |
| JPMorgan Chase & Co | 1.28 |
| Top 10 Total | 15.80 |

| Top 10 Contributors - BAB | |
|----------------------------------|-------------------|
| Issuer Name | Weight (%) |
| University of California | 2.07 |
| Commonwealth Financing Authority | 1.67 |
| State of California | 1.66 |
| State of California | 1.38 |
| American Municipal Power Inc | 1.25 |
| University of California | 1.22 |
| State of California | 1.21 |

| | |
|---|--------------|
| Los Angeles Department of Water & Power | 1.16 |
| State of Illinois | 1.14 |
| Port Authority of New York & New Jersey | 1.11 |
| Top 10 Total | 13.87 |

2. The first step towards clarity: understanding the concept of price to NAV discount

2.1 What is the definition of the price?

Price seems an easy variable to play with. Things are a bit more complicated, instead. When talking about a price, we can generally refer to four different things:

1. Transaction Price;
2. Bid Price;
3. Ask Price;
4. Mid Price.

The price of the last transaction on a given asset is referred to as the current price; however, during market hours, it is only valid for mere seconds for very liquid stocks. Bid and ask are the best possible prices at which a stock can be sold by a seller and bought by a buyer. The bid price is the maximum price a buyer is willing to pay, whereas the asking price is the minimum price that the seller is willing to accept in exchange for the security. The transaction happens when the buyer and the seller agree on a price between the bid and ask. The difference between the bid and ask price is referred to as bid-ask spread, which is the key indicator of the liquidity of the security. Smaller spreads refer to greater liquidity.

2.2 What is the definition of NAV?

Another apparent simple variable plays a role in the game, which is NAV (Net Asset Value), which is defined as the difference between the assets and the liabilities of the fund, at market close. Of course, different implications are given by different definitions of price used in the pricing of assets and liabilities at market close.

2.3 The price to NAV discount or premium: formula and normal values

The market value or price of the ETF is an arbitrary price determined by market participants. If the fund trades below its last quoted Net Asset Value, it is trading at a discount; otherwise, at a premium.

Net Asset Value per share = (Total Fund's Assets - Total Fund's Liabilities) / Total number of shares outstanding

3. A second step towards clarity: understanding ETFs underlying mechanics

3.1. What is an ETF? A brief explanation and categorization

Exchange-traded funds are a composition of various securities such as stocks, bonds, and commodities. ETFs are traded on an exchange, just like a stock, meaning they are open to fluctuations, differently from mutual funds.

Here below are summarized some types of ETFs:

- Commodity ETFs: investment in commodities including crude oil and gold;
- Bond ETFs: investment in various types of bonds: corporate, government, municipal bonds;
- Industry ETFs: track a specific industry such as oil, solar energy, electric car, software, banking;
- Currency ETFs: investment in foreign currencies;
- Inverse ETFs: shorting a stock;

3.2 The creation

The creation process for ETFs is the opposite of that for mutual funds. In mutual funds, an investor sends cash to the fund company to purchase securities; in return, the fund company issues additional shares of the fund. In the case of redemption, the existing shares owned by the investor are returned to the company in exchange for cash; on the other hand, there is not a need for cash to create an ETF.

To create an ETF, a prospective ETF manager (sponsor) has to file a plan with the SEC. After the plan is approved, the ETF manager forms an agreement with an authorized participant (AP), who has the capability to create ETF shares. The authorized participant borrows stock shares, bonds, and commodities, places them in a trust, and uses them to form ETF creation units. 50.000 shares are what is commonly designated as a unit of an ETF. Afterwards, the trust provides shares of the ETF to the AP, which are legal claims on the shares held in the trust. Because this transaction is an in-kind trade, there are no tax implications. Once the AP receives the ETFs, these are sold on the open market.

3.3 The role of authorized participants (APs)

Authorized participants are responsible for the creation and redemption of the ETFs. The ETF company gives a shopping list to authorized participants since they are the only ones authorized of the process, then AP goes out to the market to buy everything on that shopping list, collecting the underlying assets of the ETF. AP hands these assets to the ETF company, and in return, AP gets a portion of shares. When the ETF sells at a premium, authorized participants will sell ETF shares and buy the underlying securities from the market, thus will push the price of the ETF down and the underlying securities up. AP earns risk-free arbitrage profit by selling and buying overpriced/underpriced securities.

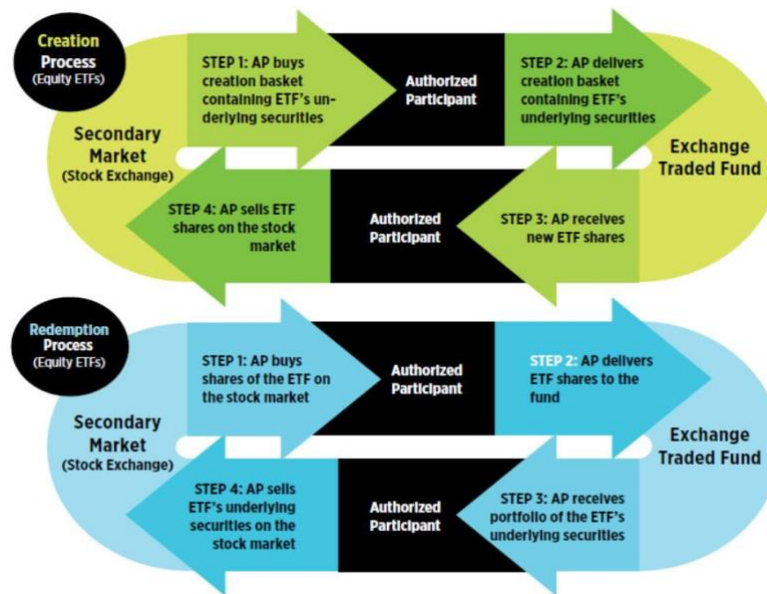


Figure 3 – A diagram exemplifying the creation and redemption process for an equity ETF

4. A real arbitrage opportunity or just an apparent trick? Possible explanations

The redemption mechanism helps market participants to wipe away arbitrage opportunities between ETFs and their corresponding underlying assets, taking the price of an ETF back to its NAV. When observing the arbitrage opportunity, usually, the middleman will redeem the ETF in exchange for its underlying assets. As the supply of ETF shares is decreased, the price should rise and get closer to its NAV. However, what happened in the market recently seems weird. When we could find a huge gap between the price of an ETF and its NAV, it seems mediators suddenly became clumsy to react and refuse to take the free lunch. What happened to the market mechanism? Does the arbitrage opportunity still exist?

As can be observed from the data, the biggest discounts among ETFs last March exist in fixed-income ETFs. The reason behind this missing arbitrage opportunity related to the structure of fixed income and its market. The gap between fixed-income ETFs and their NAVs shows more or less the gap between the liquidity of two markets, fixed-income ETF market as well as its corresponding bond markets. As said before, seeing ETF price deviate from its NAV, mediators will buy ETFs from the secondary market and redeem them in return of the underlying assets, which are bonds in this case. The Coronavirus suddenly accelerated the forecasted economy recession.

Moreover, lockdowns force companies to stop their business, causing cash shortage or even bankruptcy risk to them. To a creditor, the credit risk of bonds holding suddenly increased. Therefore, even though participants see the gap between ETFs and their NAV, they would not like to redeem and hold the bonds with increased credit risk. Additionally, some market makers, authorized participants, changed compositions of their ETF products, adding stress to bondholders, who have the bonds in the original composition, to sell those bonds to track ETFs. Comparing with stock like ETFs, the fix-income market is less liquid. When people are heading for selling assets in exchange for more cash at hand, and they chose fixed-income ETFs to do the favor, driving down quickly the prices of ETFs.

Meanwhile, the fixed income market, due to the reasons talked above, is even more illiquid than usual, widening the gap between ETFs and their NAVs. Therefore, market participants are not willing to and not

able to gain from this observed “arbitrage opportunity.” However, some investors do see an investment opportunity in ETFs as they expect those deviated ETFs’ prices to go up with the helpful measures taken by governments, and, in the long run, the gap will slowly narrow and vanish.

Before talking about financial regulations taken to alleviate the stress, let us talk more about the liquidity of the ETF market. While there is an illiquidity doom in the fixed-income market, trading of ETF remains orderly with the help of an active secondary market. As can be seen from the graph below, since it was the worst-performing day in 2009, the iShares iBoxx High Yield Corporate Bond, ticker HYG, experiences a surge of activities in the secondary market. When liquidity remains in the market, the market mechanism still has its efficiency, and ETFs are price trackers of future bond prices or expectations from investors. Therefore, the gap between the liquidity of two markets brings the gap of ETF price and its NAV. We could also read this by comparing it with the security ETF market. The stock market was also suffering from increasing volatility. However, the discount of ETFs was in a normal range, matching NAVs. It is not hard to understand that the underlying securities have higher liquidity, which is comparable to ETFs’.

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