

During the August 24th, 2015 Flash Crash, investors were caught off-guard by wide-spread price divergence among certain exchange traded funds (ETFs) and their underlying securities.

Prior to this event, most market experts agreed that liquidity issues were only a concern for ETFs that held thinly-traded securities or tracked obscure market indices. However, the 2015 liquidity event disproportionately affected those ETFs tracking the largest U.S. market indices and those with large average daily trading volumes (ADTV). This ran counter to the prevailing views on ETF liquidity, which maintained that smaller-sized ETFs and those holding thinly-traded securities would be most at risk during times of extreme market stress. In this paper we'll discuss the basics of ETFs, key liquidity indicators, the drivers behind the 2015 Flash Crash, and recommendations for ETF ownership.

ETF Liquidity

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Carrie Tallman, CFP®, CFA
Director of Research

ETF OVERVIEW:

Exchange traded funds or ETFs are marketable securities that track an index, commodities, bonds, or a basket of assets similar to an index fund. They combine some of the features of mutual funds with those of individual stocks. Like a mutual fund, ETFs can provide investors with significant diversification at a relatively low cost. Unlike mutual funds, ETFs trade on a stock exchange continuously throughout the day and as a result, generally have higher daily liquidity levels.

One major difference between ETFs and mutual funds is how shares are created, bought, and sold. In a traditional open-end mutual fund, investors buy and redeem shares directly from the fund company at the end of each trading day. In contrast, ETFs can be bought and sold throughout the trading day on an exchange (i.e. in the secondary market) at the prevailing market price. While supply and demand on the secondary market is the major determinant of an ETF's price, investors known as Authorized Participants (APs) also play a role. APs are institutional trading firms who create and redeem ETF shares at the fund's net asset value (NAV) in the primary or "arbitrage" market. Their activities are designed to minimize the bid-ask spread between an ETF's NAV and the value of its underlying securities; thus increasing liquidity.

ETFs OFFER BOTH ADVANTAGES AND DISADVANTAGES AS COMPARED TO TRADITIONAL MUTUAL FUNDS.

Advantages

- Potential for increased liquidity due to continuous trading on a secondary exchange
- Additional liquidity provided via arbitrage trading activities in the primary market through authorized participants
- Lower expense ratios on average
- Increased transparency
- Increased tax efficiencies

Disadvantages

- Potential for increased volatility
- Unforeseen liquidity issues
- Portfolios that may be skewed towards the largest borrowers in passive fixed income ETFs and towards the highest market-cap (price) stocks in equity ETFs

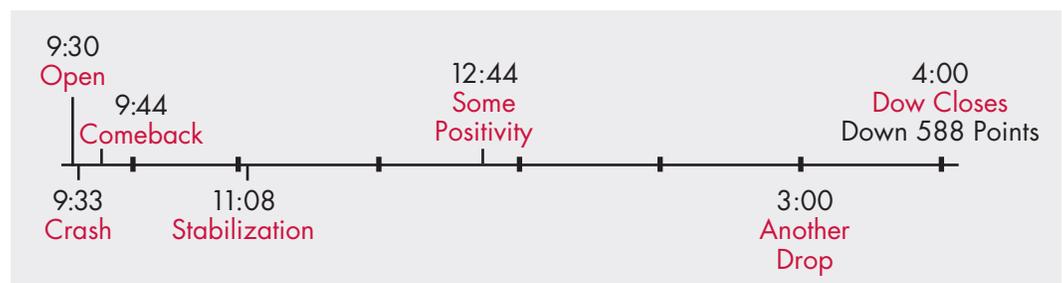
FACTORS AFFECTING ETF LIQUIDITY:

While multiple variables influence ETF liquidity, most agree that the primary factors include an ETF's bid-ask spread, its trading volume, and the bid-ask spread of an ETF's underlying securities. An ETF's bid-ask spread is the difference between the price at which an investor is willing to sell an ETF and the price at which another investor is willing to buy the ETF. The wider the bid-ask spread, all else being equal, the lower an ETF's liquidity. Another factor is average daily trading volume (ADTV), or the average number of a security's shares that trade in a day as measured over a specified time period. Higher ADTV usually indicates increased liquidity and vice versa. Finally, tight bid-ask spreads among an ETF's underlying holdings typically leads to better liquidity. This is because the creation and redemption of ETF shares by Authorized Participants (APs) in the primary or "arbitrage market" depends on the APs ability to acquire or sell the underlying securities. If the underlying securities are difficult to acquire or dispose of, APs may be less willing to provide a market for the ETF. This in turn could lead to wider bid-ask spreads and lower liquidity.

In addition to the primary liquidity factors discussed above, there are several secondary issues that may affect the ease of trading an ETF. One factor is an ETF's creation and redemption fee. An ETF will charge an AP for the right to trade in-kind shares in the primary or "arbitrage" market. Essentially, the AP pays a fee in order to try and take advantage of arbitrage opportunities that arise when an ETF's NAV deviates from the price of its underlying securities. Because this fee is a fixed cost, there is incentive for APs to favor trading the largest ETFs with high order levels. In turn, smaller-sized ETFs or those with low transaction activity may receive less attention from APs and experience lower liquidity as a result. Another factor to consider is that market makers receive rebates from exchanges that are calculated on a per share basis. This may also bias market makers to favor larger ETFs with higher trading volumes as compared to smaller funds, and thus enhance liquidity for the biggest funds.

WHAT DROVE THE AUGUST 2015 FLASH CRASH:

Considering the above factors, most ETF experts believed that the largest ETFs tracking major U.S. market indices would be less susceptible to liquidity events. Paradoxically, during the August 2015 Flash Crash, the largest, most liquid ETFs with the highest correlations to the S&P 500 Index experienced the biggest problems. One of the hardest-hit and largest funds was down as much as 38% during the crash while the value of its underlying holdings were down only about 3% for the day. The fund in question holds large-cap blue-chip companies which typically don't see such dramatic price swings. Similarly, an even larger fund that tracks the widely-owned S&P 500 Index fell close to 26% during the opening minutes of trading while its underlying holdings were only down about 5% over the same time period.



Although first introduced in 1993, exchange-traded funds are still a relatively new investment vehicle.

Several factors contributed to these unexpected outcomes. Back in 2010 after a similar Flash Crash, regulators implemented a National Market System (NMS) pilot plan which included a new trading mechanism called limit up-limit down (LULD). LULD's are individual security circuit breakers that halt trading when a stock or fund falls (or rises) by a certain percentage for a certain period of time. Many of these trading halts had been triggered prior to the market open on August 24th, 2015. As a result, market makers widened bid-ask spreads in stocks and ETFs to accommodate the uncertainty. However, when markets opened some orders were executed at unusually low bids prompting even more LULD pauses. At the same time, volume spiked which exacerbated bid-ask spreads and led to still more trading halts. Many believe it was computer-programs such as high-frequency traders (HFTs) that caused volumes to jump. Given the lack of price discovery, authorized participants, who act as arbitrageurs between ETF prices and their underlying securities, sat on the sidelines. Prices were so divergent and irrational they felt it was too risky to step into the market.

The end result was that the most heavily traded, and consequently, some of the largest and most liquid ETFs, saw the widest divergence between their prices and those of their underlying securities. Although many point to market structure and trading issues as the primary culprits for the chaos that morning, the more complex structure of ETFs clearly played a role. Overall, the 2015 Flash Crash highlights the potential for increased risk due to unforeseen consequences in relatively newer investment securities like ETFs.

Following the 2015 Flash Crash, U.S. exchanges have worked together to standardize exchange re-openings following trading halts and eliminate clearly erroneous execution rules when trading halts are happening. They are also working with the SEC on certain recommendations, including eliminating the time periods when securities trade without an LULD halt in place. Since implementing some of these corrective actions, exchanges note that there were far fewer security halts, less price disparity between ETFs and their underlying securities, and much smoother trading following the surprise "Brexit" referendum announcement last year. However, more work is still needed.

RECOMMENDATIONS (see ETF Liquidity Factors Table):

Although first introduced in 1993, exchange-traded funds are still a relatively new investment vehicle. As witnessed in the August 2015 Flash Crash, complex market forces as well as security characteristics can lead to unexpected and undesirable trading activity. While exchanges and regulators are working together to improve trading outcomes, there are some precautions we can take as a firm, regarding ETFs.

ETF Liquidity Factors Table

SECURITY	MKT VALUE (\$BILL) 8.24.15	INTRA-DAY PRICE RETURN	FULL-DAY PRICE RETURN
S&P 500 Index	N/A	-5%	-3.9%
ETF A	63.5	-26%	-4.2%
ETF B	18.2	-38%	-4.3%
ETF C	12.8	-35%	-3.5%
ETF D	4.6	-46%	-5.3%

These include owning ETFs that track well-known market indices and avoiding funds that hold illiquid securities or track lesser-known indices. Although the 2015 Flash Crash experience suggests these factors may be less important than originally thought, they remain a key determinant in an investor's ability to buy and sell a fund. A second suggestion is to only purchase those ETFs with adequate average daily trading volume (ADTV) levels. More specifically, investors can look at a fund's ADTV turnover ratio, which is its ADTV divided by shares outstanding. This ratio considers secondary market liquidity and research from the SEC shows that ETFs with higher turnover ratios have a lower probability of pausing during times of market turbulence. These funds may be able to avoid the excessive trading pauses – and thus liquidity issues – experienced by many ETFs during the 2015 Flash Crash. Finally, investors can use a fund's indicative net asset value (iNAV), which calculates the value of an ETF based on the market values of its underlying securities, and compare it with the current price of the fund in question. Any funds with persistently wide disparities should be avoided.

Regarding trading recommendations, investors should avoid buying or selling ETFs at market opens or during market closes. They should also avoid the use of stop-loss orders and if needed, use limit orders instead. Finally, taking a wait-and-see approach is highly recommended. While an ETF's price may fluctuate from the value of its underlying securities during times of market turbulence, arbitrage opportunities for APs will likely prevent any such divergence from existing for long. Therefore, if an ETF's underlying securities are widely-owned, price disparity between an ETF and its stock holdings should eventually converge as arbitrageurs do their work.

RECOMMENDATIONS TO INVESTORS:

1. Avoid ETF holding illiquid securities or tracking lesser-known indices
2. Target ETFs with adequate ADTV levels
3. Utilize iNAV
4. Avoid trading at market open and close
5. Avoid stop loss orders
6. Allow ETF to regulate during market turbulence

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