

## ETF Discussion OpsRisk Limited

The Central Bank of Ireland in its “Discussion Paper 6 – Exchange Traded Funds” released May 15, 2017 states:<sup>1</sup>

“...ETFs are investment funds which are traded on stock exchanges and other markets in the same way as listed equities are (and so can be purchased at any time during the trading day, can be purchased on margin and can be short sold). Because ETFs enable investors to achieve diversified exposure through a regulated investment fund structure they are used by both retail and institutional investors alike....”

This is a common assumption in the market.

### Background and Operational Factors

Exchange Traded Funds (ETFs) in the U.S. are subject to the same trade and settlement rules and processes as listed equity securities. The U.S. Securities and Exchange Commission (SEC) in its “Key Points About Regulation SHO” states:<sup>2</sup>

“...Generally, investors must complete or settle their security transactions within three business days. This settlement cycle is known as “T+3,” shorthand for “trade date plus three days....”, and:

“...Delivery on sales should be made by the settlement date. Under Rule 204, firms that clear and settle trades must deliver securities to a registered clearing agency for clearance and settlement on a long or short sale in any equity security by the settlement date or must take immediate action to close out failures to deliver by no later than the beginning of regular trading hours on T+4 (for short sales) or T+6 (for long sales and fails attributable to bona fide market making)....”

In March 2017, the SEC adopted a T+2 settlement cycle and amended Rule 15c6-1(a) which:<sup>3</sup>

“...would mean that when an investor buys a security, the brokerage firm must receive payment from the investor no later than two business days after the trade is executed. When an investor sells a security, the investor must deliver to the brokerage firm the investor’s security no later than two business days after the sale....”

While ETFs share the same trade and settlement rules and processes as listed equity securities, ETFs are subject to a level of operational responsibilities not shared by listed equity securities. The

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<sup>1</sup> Central Bank of Ireland. (2017). *Discussion Paper 6 - Exchange Traded Funds*. Dublin: Central Bank of Ireland.

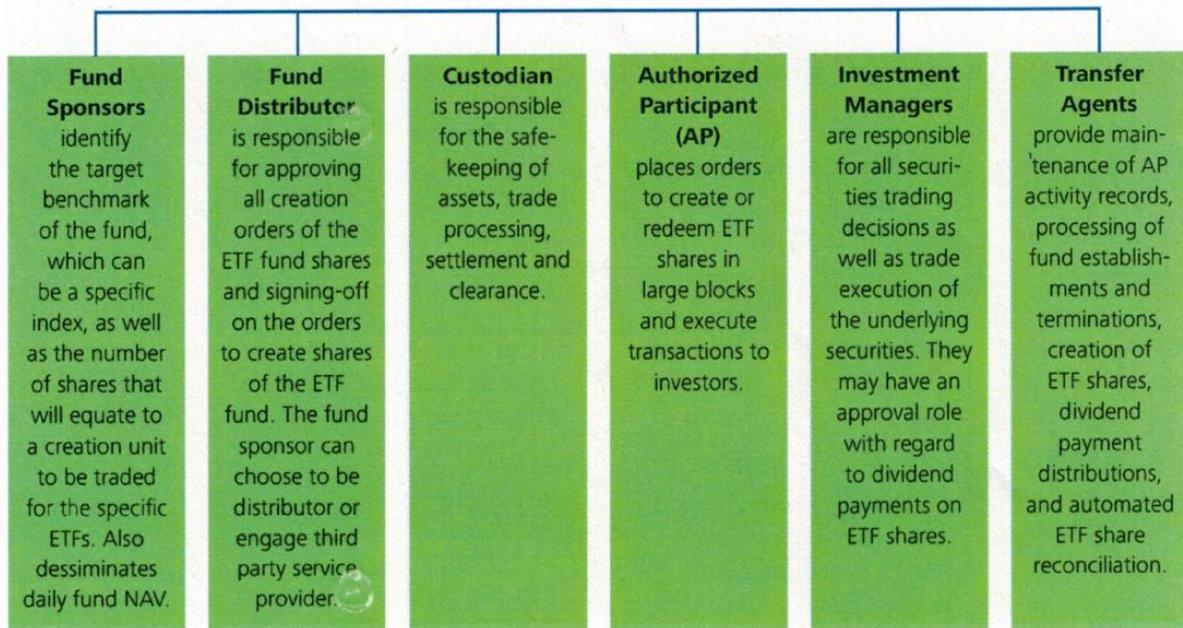
<sup>2</sup> U.S. Securities and Exchange Commission. (2015, April 8). *Key Points About Regulation SHO*. Retrieved from U.S. Securities and Exchange Commission: <https://www.sec.gov/investor/pubs/regsho.htm>

<sup>3</sup> U.S. Securities and Exchange Commission. (2017, March 22). *SEC Adopts T+2 Settlement Cycle for Securities Transactions*. Retrieved from U.S. Securities and Exchange Commission: <https://www.sec.gov/news/press-release/2017-68-0>

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following figure prepared by Deloitte in 2009 identifies 6 operational responsibilities unique to ETFs.<sup>4</sup>

**Figure 5: Operational Responsibilities of ETF Key Players**



Source: Bank of New York Mellon

**Exchange-Traded Funds** Challenging the Dominance of Mutual Funds? 9

The operational responsibilities of the Authorized Participant (AP) are particularly important to the operational state of the ETF. The Investment Company Institute (ICI) in its “2017 *Investment Company Fact Book*” provides the following outline of the responsibilities of the AP:<sup>5</sup>

<sup>4</sup> Deloitte Services LP. (2009). *A Deloitte Research Report - Exchange-Traded Funds*. Deloitte Services LP.

<sup>5</sup> Investment Company Institute (ICI). (2017). *2017 Investment Company Fact Book*. Investment Company Institute (ICI).

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“ ...

APs play a key role in the primary market for ETF shares because they are the only investors allowed to interact directly with the fund. APs do not receive compensation from an ETF or its sponsor and have no legal obligation to create or redeem the ETF's shares. APs typically derive their compensation from acting as dealers in ETF shares and create and redeem shares in the primary market when doing so is a more effective way of managing their firms' aggregate exposure than trading in the secondary market. Some APs are clearing brokers (rather than dealers) and receive payment for processing creations and redemptions as an agent for a wide array of market participants such as registered investment advisers and various liquidity providers, including market makers, hedge funds, and proprietary trading firms.

Some APs also play another role in the ETF ecosystem by acting as registered market makers in ETF shares that trade on an exchange. Secondary market trading of ETFs, however, does not rely solely on these APs. In fact, a host of other entities provide liquidity—two-sided (buy and sell) quotes—in ETF shares other than APs. These other entities also help facilitate trading of ETF shares in the secondary market. Domestic equity ETFs have the most liquidity providers (Figure 3.4). But other types of ETFs—such as emerging market equity, domestic high-yield bond, and emerging market bond—also have multiple liquidity providers in the secondary market.

....”

A critical point noted in this outline from ICI of AP responsibilities is that while there is an “expectation” that ETFs will be created or redeemed, APs have no legal obligation to create or to redeem ETF shares.

From a market operational perspective, actual settlement converts market liquidity into actual cash settlement liquidity on the agreed settlement day whether a T+2, T+3, T+6, or T+AnyNumberOfDays trade event. If all the processes, participants, and in the case of ETFs, operational responsibilities do not all “seamlessly” align to convert market liquidity into actual cash liquidity for each trade event or transaction on the agreed date, an operational risk is created and exists until actual settlement occurs.

The systemic operational risk metric representing that operational risk is based on the total value of securities reported that were not delivered (fail or fail-to-deliver) on the date (settlement date) specified at the time of the trade event or transaction. Settlement date is the selected metric because as the agreed settlement date it marks the official date for change of legal ownership and possession. Furthermore, the inability to find securities to make actual cash settlement on settlement date in the current nanosecond trading environment casts doubt on market liquidity.

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Fails-to-deliver data is available from the U.S. Securities and Exchange Commission (SEC). The SEC data is made available to the SEC by the National Securities Clearing Corporation (NSCC), a subsidiary of The Depository Trust & Clearing Corporation (DTCC). The NSCC was:<sup>6</sup>

“...established in 1976, provides clearing, settlement, risk management, central counterparty services and a guarantee of completion for certain transactions for virtually all broker-to-broker trades involving equities, corporate and municipal debt, American depository receipts, exchange-traded funds, and unit investment trusts.

NSCC also nets trades and payments among its participants, reducing the value of payments that need to be exchanged by an average of 98% each day. NSCC generally clears and settles trades on a T+3 basis.

NSCC is regulated by the U.S. Securities and Exchange Commission (SEC)....”

The SEC in its “Fails-to-Deliver Data” describes the available fails-to-deliver data:<sup>7</sup>

“...contains the date, CUSIP numbers, ticker symbols, issuer name, price, and total number of fails-to-deliver (i.e., the balance level outstanding) recorded in the National Securities Clearing Corporation's ("NSCC") Continuous Net Settlement (CNS) system aggregated over all NSCC members. Data prior to September 16, 2008 include only securities with a balance of total fails-to-deliver of at least 10,000 shares as of a particular settlement date. Data on or after September 16, 2008 include all securities with a balance of total fails-to-deliver as of a particular settlement date. The data include fails-to-deliver in equity securities.

The values of total fails-to-deliver shares represent the aggregate net balance of shares that failed to be delivered as of a particular settlement date. If the aggregate net balance of shares that failed to be delivered is less than 10,000 as of a particular settlement date prior to September 16, 2008, then no record will be present in the file for that date even if there are fails in that security. If the aggregate net balance of shares that failed to be delivered is zero as of a particular settlement date on or after September 16, 2008, then no record will be present in the file for that date. Fails to deliver on a given day are a cumulative number of all fails outstanding until that day, plus new fails that occur that day, less fails that settle that day. The figure is not a daily amount of fails, but a combined figure that includes both new fails on the reporting day as well as existing fails. In other words, these numbers reflect aggregate fails as of a specific point in time, and may have little or no relationship to yesterday's aggregate fails. Thus, it is important to note that the age of fails cannot be determined by looking at these numbers. In addition, the underlying source(s) of the fails-to-deliver shares is not necessarily the same as the underlying source(s) of the fails-to-deliver shares reported the day prior or the day after....”

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<sup>6</sup> Depository Trust & Clearing Corporation (DTCC). (2017, July 25). *About DTCC - National Securities Clearing Corporation (NSCC)*. Retrieved from Depository Trust & Clearing Corporation (DTCC): <http://www.dtcc.com/about/businesses-and-subsidiaries/nsc.aspx>

<sup>7</sup> U.S. Securities and Exchange Commission. (2017, June 30). *Fails-to-Deliver Data*. Retrieved from U.S. Securities and Exchange Commission: <https://www.sec.gov/data/foiadocsfailsdatahtm>

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The SEC in its data description states further that:<sup>8</sup>

...Please note that fails-to-deliver can occur for a number of reasons on both long and short sales. Therefore, fails-to-deliver are not necessarily the result of short selling, and are not evidence of abusive short selling or “naked” short selling....”

The reported SEC/NSCC securities transactions fails-to-deliver data is incomplete. The SEC/NSCC data omits fails-to-deliver data from ex-clearing, internalized, or “special securities transactions” operational processes. The SEC/NSCC fails-to-deliver data reports securities transactions settlement in accordance with NSCC “Rules and Procedures.”<sup>9</sup> Furthermore, as outlined by the ICI outline of AP responsibilities:<sup>10</sup>

An authorized participant (AP) is typically a large financial institution that enters into a legal contract with an ETF distributor to create and redeem shares of the fund. In addition, APs are US-registered, self-clearing broker-dealers that can process all required trade submission, clearance, and settlement transactions on their own account; they are also full participating members of the National Securities Clearing Corporation and the Depository Trust Company.

As such, the fails-to-deliver data reported by SEC/NSCC is considered a reliable securities market source and metric that reflects the trade settlement patterns and practices of NSCC members, including APs, clearing transactions through the national clearing system.

### SEC/NSCC Fails-to-Deliver History

The SEC/NSCC history of the total value of fails-to-deliver for securities with a balance of at least 10,000 shares as of a particular settlement date since May 2007 and the history of the total value of fails-to-deliver for securities with a balance as of a particular settlement date since September 2008 is presented on Chart 1.

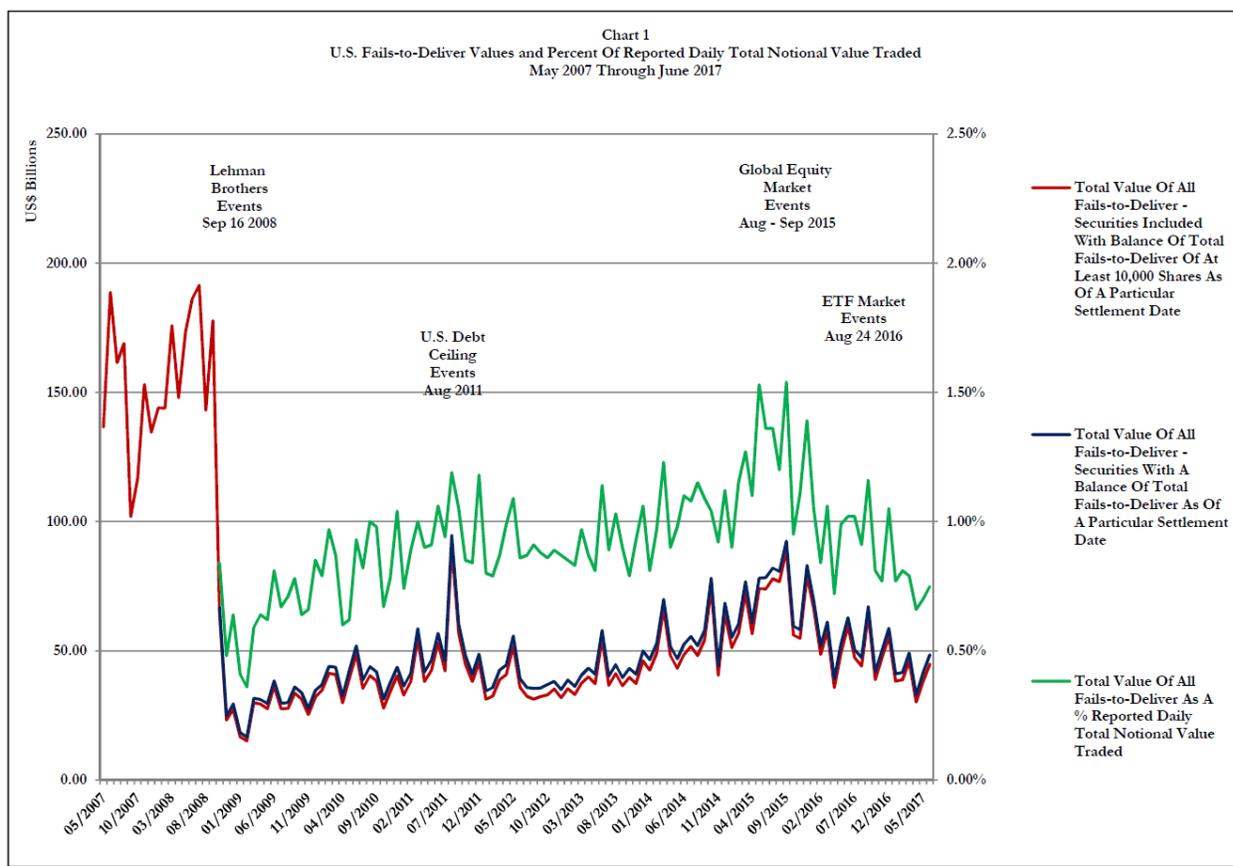
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<sup>8</sup> U.S. Securities and Exchange Commission. (2017, June 30). *Fails-to-Deliver Data*. Retrieved from U.S. Securities and Exchange Commission: <https://www.sec.gov/data/foiadocsfailsdatahtm>

<sup>9</sup> Depository Trust & Clearing Corporation (DTCC). (2017, June 23). *Rules & Procedures of National Securities Clearing Corporation*. Retrieved from Depository Trust & Clearing Corporation (DTCC) - Rules & Procedures: <http://www.dtcc.com/legal/rules-and-procedures>

<sup>10</sup> Investment Company Institute (ICI). (2017). *2017 Investment Company Fact Book*. Investment Company Institute (ICI).

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Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC, Bats Global Markets (Bats), a CBOE company.

Note: Historical market Notional Value Traded is the total for all of the U.S. equities exchanges and trade-reporting facilities (TRFs). Notional Value is calculated by multiplying the execution price of each transaction by the total number of shares executed in each transaction.

Chart 1 shows the SEC/NSCC history of the total value of fails-to-deliver for securities with a balance as of a particular settlement date since October 2008 as a percentage of the Daily Total Notional Value Traded<sup>11</sup> reported by Bats Global Markets (Bats), a CBOE company, for all of the U.S. equities exchanges and trade-reporting facilities (TRFs).

Chart 1 demonstrates a significantly reduced level of fails-to-deliver post-2008 financial distress. Chart 1 indicates the percentage history of total fails-to-deliver value as reported in the SEC/NSCC data is generally in the 1.00% range of the Daily Total Notional Value Traded. During the global equity market upheaval during August and September 2015, settlement liquidity demands saw the percentage of total fails-to-deliver value spike to the 1.50% range.

<sup>11</sup> Bats Global Markets (Bats), a CBOE company - "Notional Value", which is also referred to as "Dollar Value Traded", is calculated by multiplying the execution price of each transaction by the total number of shares executed in each transaction. This method of calculating market share, as opposed to simply using the total number of shares that traded hands, can be a better representation of the actual "size" of a market.

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These apparent nominal percentage fails-to-deliver ranges disguise fails-to-deliver patterns and concentration since the 2008 financial turmoil.

In the midst of the 2008 financial market turmoil, the SEC issued two rulemaking orders amending Regulation SHO under the Securities Exchange Act of 1934 (“Exchange Act”) by making permanent amendments contained in Interim Final Temporary Rule 204T (“temporary Rule 204T”) of Regulation SHO.<sup>12</sup>

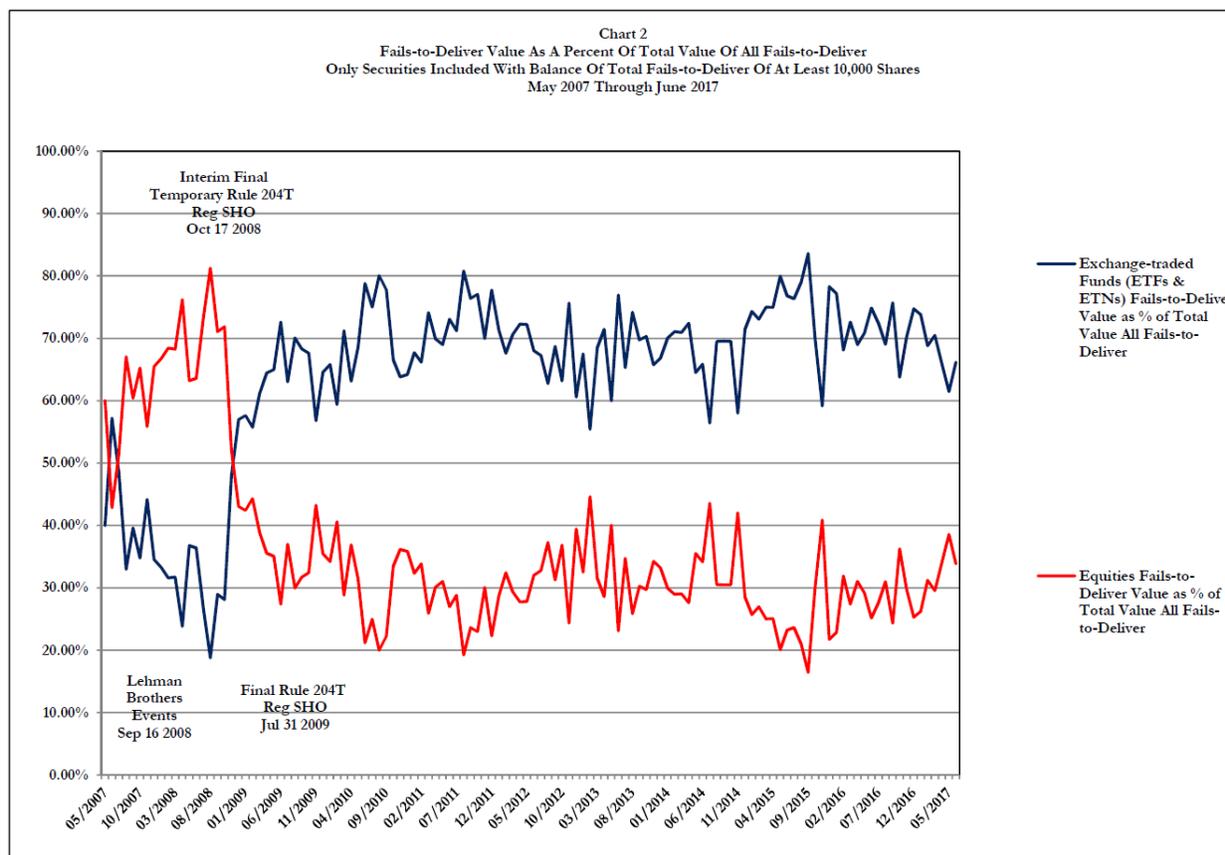
These rulemaking actions represented a series of steps to manage or curtail perceived abusive short selling activity and persistent fails-to-deliver in certain equity securities. During this period of turmoil and regulatory change, the relationship between listed equity securities fails-to-deliver and ETFs fail-to-deliver completely reversed.

Chart 2 shows the history of securities with a balance of total fails-to-deliver of at least 10,000 shares as of a particular settlement date since May 2007. In general, since late 2008 ETFs fails-to-deliver have accounted for 60% to 70%, and occasionally as much as 80%, of the fails-to-deliver value reported in the SEC/NSCC data.

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<sup>12</sup> U.S. Securities and Exchange Commission. (2009, July 31). *Amendments to Regulation SHO, Release No. 34-60388; File No. S7-30-08*. Retrieved from U.S. Securities and Exchange Commission: <https://www.sec.gov/rules/final/2009/34-60388.pdf>

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Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse.

### A New Look - Concentration

ETFs' movement to centre stage in the capital markets brings a systemic operational risk that has a substantially different look from the listed equity securities systemic operational risk. Total market systemic operational risk is disproportionately concentrated in a small number of ETFs.

Table 1 highlights the new look systemic operational risk. For the fiscal year ending June 30, 2017, over 15,000 security symbols are included in the SEC/NSCC fails-to-deliver data for the period. The Top 10 fails-to-deliver securities are all ETFs; none are listed equity securities. Three ETFs account for approximately 10% of the total fails-to-deliver value of all securities that have been reported in the SEC/NSCC data as fails-to-deliver. The 3 ETFs<sup>13</sup> are the SPDR S&P 500 ETF Trust (SPY) which invests in securities that seek to track the performance of the S&P 500<sup>®</sup> Index, PowerShares QQQ Trust<sup>SM</sup>, Series 1 (QQQ) which invests in securities that seek to track the performance of the Nasdaq-100 Index<sup>®</sup>, and iShares Russell 2000 ETF (IWM) which invests in securities that seek to track the performance of the Russell 2000 Index. These three ETFs invest in arguably very market-liquid, widely-held, listed equity securities.

<sup>13</sup> ETF.com LLC/IndexUniverse LLC. (n.d.). *ETF Screener & Database*. Retrieved from ETF.com: <http://www.etf.com/etfanalytics/etf-finder>

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Security Type	Symbol	Description	# of Days Fails-to-Deliver Reported	Value of ETFs Fails-to-Deliver - US\$	Value of Equities Fails-to-Deliver - US\$	Value of Fails-to-Deliver - US\$	Value of Fails-to-Deliver as % of Total Value of All Fails-to-Deliver	Cumulative Value of Fails-to-Deliver as % of Total Value of All Fails-to-Deliver
ETF	SPY	SPDR S&P 500 ETF Trust	236	22,544,825,474.68		22,544,825,474.68	3.96%	3.96%
ETF	QQQ	PowerShares QQQ Trust	220	19,740,491,491.83		19,740,491,491.83	3.46%	7.42%
ETF	IWM	iShares Russell 2000 ETF	231	18,844,197,739.96		18,844,197,739.96	3.31%	10.72%
ETF	HYG	iShares iBoxx \$ High Yield Corporate Bond ETF	235	9,596,965,853.09		9,596,965,853.09	1.68%	12.41%
ETF	XLU	Utilities Select Sector SPDR Fund	237	7,761,160,421.86		7,761,160,421.86	1.36%	13.77%
ETF	TLT	iShares 20+ Year Treasury Bond ETF	207	5,607,029,394.59		5,607,029,394.59	0.98%	14.75%
ETF	EEM	iShares MSCI Emerging Markets ETF	204	5,494,916,602.87		5,494,916,602.87	0.96%	15.72%
ETF	XLP	Consumer Staples Select Sector SPDR Fund	202	5,483,008,081.46		5,483,008,081.46	0.96%	16.68%
ETF	IYR	iShares U.S. Real Estate ETF	210	4,757,348,063.61		4,757,348,063.61	0.83%	17.51%
ETF	SMH	VanEck Vectors Semiconductor ETF	222	4,585,340,862.53		4,585,340,862.53	0.80%	18.32%
Total of Top 10 Securities				104,415,283,986.48	0.00	104,415,283,986.48	18.32%	18.32%
Total of All Other Securities				284,735,060,554.71	180,837,909,370.96	465,572,969,925.67	81.68%	81.68%
Total of All Securities				389,150,344,541.19	180,837,909,370.96	569,988,253,912.15	100.00%	100.00%
Number of Distinct Security Symbols Reported							15,178	

Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC.

The ICI in its “2017 Investment Company Fact Book” reported that:<sup>14</sup>

ETFs have been available for nearly 25 years, and in that time, large-cap domestic equity ETFs have accounted for the largest proportion of all ETF assets. At year-end 2016, large-cap domestic equity ETFs amounted to \$687 billion—or 27 percent—of all ETF assets (Figure 3.9).

Large cap domestic equity securities are important not only to ETFs but also to the listed equities securities market. The Dow Jones Industrial Average Index, an S&P Dow Jones Indices LLC, a division of S&P Global index<sup>15</sup> consists of 30 “blue chip”, large cap listed equity securities which are also included in the S&P 500 Index. The S&P 500 Index focuses on the large cap sector of the market.<sup>16</sup> The Dow Jones Industrial Average Index is widely tracked and the component listed equity securities are widely held.

<sup>14</sup> Investment Company Institute (ICI). (2017). *2017 Investment Company Fact Book*. Investment Company Institute (ICI).

<sup>15</sup> S&P Dow Jones Indices LLC, a division of S&P Global. (2017). *Dow Jones Averages Methodology*. S&P Dow Jones Indices LLC, a division of S&P Global.

<sup>16</sup> S&P Dow Jones Indices LLC, a division of S&P Global. (2017). *Ticker: SPX*. Retrieved from S&P 500®: <http://ca.spindices.com/indices/equity/sp-500>

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Since March 19, 2015<sup>17</sup>, these same 30 listed equity securities make up the Dow Jones Industrial Average Index of large cap securities<sup>18</sup>. Fails-to-deliver metrics for this group of large cap equity securities provides fails-to-deliver results that can be compared to fails-to-deliver metrics for large cap based ETFs. For fiscal year ending June 30, 2017, Table 2 lists the 30 listed equity securities included in the Dow Jones Industrial Average Index. The component listed equity securities included in this Index account for 1.55% of the total fails-to-deliver value of all securities reported in the SEC/NSCC data as fails-to-deliver.

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<sup>17</sup> Business Insider. (n.d.). *Apple is joining the Dow*. Retrieved from Tech Insider: <http://www.businessinsider.com/apple-is-joining-the-dow-2015-3>

<sup>18</sup> Dow Jones & Company, Inc. (n.d.). *The Ins and Outs of the Dow Jones Industrial Average*. Retrieved from The Wall Street Journal: <http://www.wsj.com/graphics/djia-components-history/>

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Security Type	Symbol	Description	# of Days Fails-to-Deliver Reported	Value of Fails-to-Deliver - US\$	Value of Fails-to-Deliver as % of Total Value of All Fails-to-Deliver	Cumulative Value of Fails-to-Deliver as % of Total Value of All Fails-to-Deliver
Equity	AAPL	Apple Inc.	219	1,204,648,824.02	0.21%	0.21%
Equity	PG	Procter & Gamble Company	169	1,123,476,860.06	0.20%	0.41%
Equity	V	Visa Incorporated	180	757,424,975.06	0.13%	0.54%
Equity	XOM	Exxon Mobil Corporation	196	411,186,501.90	0.07%	0.61%
Equity	WMT	Wal-Mart Stores Incorporated	180	404,184,481.56	0.07%	0.68%
Equity	BA	Boeing Company	138	391,230,430.50	0.07%	0.75%
Equity	JPM	JPMorgan Chase & Company	180	333,741,213.55	0.06%	0.81%
Equity	VZ	Verizon Company	175	299,687,046.85	0.05%	0.86%
Equity	KO	Coca-Cola Company	164	277,773,330.96	0.05%	0.91%
Equity	DIS	Walt Disney Company	148	273,622,175.10	0.05%	0.96%
Equity	GE	General Electric Company	192	263,132,961.85	0.05%	1.01%
Equity	CAT	Caterpillar Incorporated	171	249,362,438.86	0.04%	1.05%
Equity	GS	Goldman Sachs Group Incorporated	127	235,538,987.18	0.04%	1.09%
Equity	INTC	Intel Corporation	192	233,178,723.15	0.04%	1.13%
Equity	MSFT	Microsoft Corporation	189	232,776,959.91	0.04%	1.17%
Equity	IBM	International Business Machines	162	220,193,135.02	0.04%	1.21%
Equity	JNJ	Johnson & Johnson	180	206,324,394.19	0.04%	1.25%
Equity	NKE	NIKE Incorporated	152	206,235,932.95	0.04%	1.28%
Equity	CVX	Chevron Corporation	169	195,322,394.19	0.03%	1.32%
Equity	HD	Home Depot Incorporated	197	174,046,187.00	0.03%	1.35%
Equity	MCD	McDonald's Corporation	130	167,795,273.41	0.03%	1.38%
Equity	MMM	3M Company	157	160,500,282.21	0.03%	1.41%
Equity	DD	E. I. du Pont de Nemours and Company	137	143,485,639.35	0.03%	1.43%
Equity	UNH	UnitedHealth Group Inc.	134	136,769,981.79	0.02%	1.46%
Equity	CSCO	Cisco Systems, Inc.	165	129,027,303.08	0.02%	1.48%
Equity	PFE	Pfizer Incorporated	173	111,728,738.69	0.02%	1.50%
Equity	MRK	Merck & Company, Incorporated	148	106,886,780.12	0.02%	1.52%
Equity	UTX	United Technologies	105	62,269,705.04	0.01%	1.53%
Equity	TRV	The Travelers Companies, Inc.	134	55,600,068.80	0.01%	1.54%
Equity	AXP	American Express Company	132	48,747,298.11	0.01%	1.55%
Total Value of Fails-to-Deliver of Dow 30 Component Securities				8,815,899,024.46	1.55%	1.55%
Total Value of Fails-to-Deliver of All Other Securities				561,172,354,887.69	98.45%	98.45%
Total Value of Fails-to-Deliver of All Securities				569,988,253,912.15	100.00%	100.00%
Number of Distinct Security Symbols Reported				15,178		

Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC, S&P Dow Jones Indices LLC, a division of S&P Global.

The ICI in its “2017 Investment Company Fact Book” particularly noted the current and historical importance of the ETFs large cap market segments. Fails-to-deliver metrics for the 30 largest ETFs included in the large cap market segments reported by ETF.com on June 30, 2017 are presented on Table 3. Table

## **ETF Discussion**

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3 shows this group of 30 ETFs account for 9.70% of the total fails-to-deliver value of all securities that have been reported in the SEC/NSCC data as fails-to-deliver. This compares to 1.55% of the total fails-to-deliver value of all securities that have been reported for the 30 large cap listed equity securities that make up the Dow Jones Industrial Average Index.

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<b>Table 3</b> <b>30 Largest U.S. Large Cap Exchange Traded Funds Fails-to-Deliver Value</b> <b>Based On Assets Under Management And Included In The Equity: U.S. - Large Cap Market Segments</b> <b>Reported By ETF.com On June 30, 2017</b> <b>For The Fiscal Year Ending June 30, 2017</b>						
Security Type	Symbol	Description	# of Days Fails-to-Deliver Reported	Value of Fails-to-Deliver - US\$	Value of Fails-to-Deliver as % of Total Value of All Fails-to-Deliver	Cumulative Value of Fails-to-Deliver as % of Total Value of All Fails-to-Deliver
ETF	SPY	SPDR S&P 500 ETF Trust	236	22,544,825,474.68	3.96%	3.96%
ETF	QQQ	PowerShares QQQ Trust	220	19,740,491,491.83	3.46%	7.42%
ETF	DIA	SPDR Dow Jones Industrial Average ETF Trust	202	2,370,250,275.03	0.42%	7.83%
ETF	IVV	iShares Core S&P 500 ETF	152	769,310,589.75	0.13%	7.97%
ETF	SCHV	Schwab U.S. Large-Cap Value ETF	239	662,794,590.57	0.12%	8.09%
ETF	IVE	iShares S&P 500 Value ETF	168	616,650,725.58	0.11%	8.19%
ETF	SDOG	ALPS Sector Dividend Dogs ETF	214	610,015,298.39	0.11%	8.30%
ETF	SPHD	PowerShares S&P 500 High Dividend Low Volatility Portfolio	198	607,183,025.01	0.11%	8.41%
ETF	SCHG	Schwab U.S. Large-Cap Growth ETF	235	597,451,055.68	0.10%	8.51%
ETF	NOBL	ProShares S&P 500 Dividend Aristocrats ETF	215	583,243,996.46	0.10%	8.61%
ETF	SCHX	Schwab U.S. Large-Cap ETF	237	566,630,275.30	0.10%	8.71%
ETF	GSLC	Goldman Sachs ActiveBeta U.S. Large Cap Equity ETF	190	504,688,628.15	0.09%	8.80%
ETF	MGK	Vanguard Mega Cap Growth ETF	197	475,138,801.85	0.08%	8.89%
ETF	SPLV	PowerShares S&P 500 Low Volatility Portfolio	174	438,276,437.94	0.08%	8.96%
ETF	VOO	Vanguard S&P 500 ETF	161	419,307,452.39	0.07%	9.04%
ETF	FNDX	Schwab Fundamental US Large Co. Index ETF	225	418,553,095.89	0.07%	9.11%
ETF	IWB	iShares Russell 1000 ETF	145	390,757,068.33	0.07%	9.18%
ETF	MGV	Vanguard Mega Cap Value ETF	228	376,514,063.68	0.07%	9.24%
ETF	VOOG	Vanguard S&P 500 Growth ETF	208	370,292,448.06	0.06%	9.31%
ETF	IVW	iShares S&P 500 Growth ETF	151	322,651,042.11	0.06%	9.37%
ETF	OEF	iShares S&P 100	124	318,276,798.27	0.06%	9.42%
ETF	PRF	PowerShares FTSE RAFI US 1000 Portfolio	151	291,297,589.85	0.05%	9.47%
ETF	VUG	Vanguard Growth ETF	157	249,862,008.03	0.04%	9.52%
ETF	RSP	Guggenheim S&P 500 Equal Weight ETF	126	227,928,843.14	0.04%	9.56%
ETF	VV	Vanguard Large-Cap ETF	148	199,959,284.85	0.04%	9.59%
ETF	DLN	WisdomTree U.S. LargeCap Dividend Fund	143	197,471,986.05	0.03%	9.63%
ETF	IWD	iShares Russell 1000 Value ETF	161	150,411,294.44	0.03%	9.65%
ETF	IWF	iShares Russell 1000 Growth ETF	142	148,822,150.60	0.03%	9.68%
ETF	VTV	Vanguard Value ETF	127	82,397,052.61	0.01%	9.69%
ETF	RPG	Guggenheim S&P 500 Pure Growth ETF	60	18,700,946.88	0.00%	9.70%
Total Value of Fails-to-Deliver of 30 Largest U.S. Large Cap Exchange Traded Funds				55,270,153,791.40	9.70%	9.70%
Total Value of Fails-to-Deliver of All Other Securities				514,718,100,120.75	90.30%	90.30%
Total Value of Fails-to-Deliver of All Securities				569,988,253,912.15	100.00%	100.00%
Number of Distinct Security Symbols Reported				15,178		

Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC.

## **ETF Discussion**

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Using assets under management as reported by ETF.com on June 30, 2017 as the selection factor, the 30 largest ETFs were identified as a representative group that might be considered to be “blue chip” ETFs. This group of ETFs includes ETFs from across equity, fixed income, and commodity market segments. Table 4 reveals that this group of 30 ETFs account for 15.11% of the total fails-to-deliver value of all securities that have been reported in the SEC/NSCC data as fails-to-deliver. This compares to the 1.55% of the total fails-to-deliver value of all securities that have been reported for the 30 securities that make up the Dow Jones Industrial Average Index blue chip listed equity securities.

## ETF Discussion OpsRisk Limited

Table 4  
30 Largest U.S. Exchange Traded Funds (ETFs and ETNs) Fails-to-Deliver Value  
Based On Assets Under Management  
Reported By ETF.com On June 30, 2017  
For The Fiscal Year Ending June 30, 2017

Security Type	Symbol	Description	Segment	# of Days Fails-to-Deliver Reported	Value of Fails-to-Deliver - US\$	Value of Fails-to-Deliver as % of Total Value of All Fails-to-Deliver	Cumulative Value of Fails-to-Deliver as % of Total Value of All Fails-to-Deliver
ETF	SPY	SPDR S&P 500 ETF Trust	Equity: U.S. - Large Cap	236	22,544,825,474.68	3.96%	3.96%
ETF	QQQ	PowerShares QQQ Trust	Equity: U.S. - Large Cap	220	19,740,491,491.83	3.46%	7.42%
ETF	IWM	iShares Russell 2000 ETF	Equity: U.S. - Small Cap	231	18,844,197,739.96	3.31%	10.72%
ETF	EEM	iShares MSCI Emerging Markets ETF	Equity: Emerging Markets - Total Market	204	5,494,916,602.87	0.96%	11.69%
ETF	VWO	Vanguard FTSE Emerging Markets ETF	Equity: Emerging Markets - Total Market	192	3,328,142,848.31	0.58%	12.27%
ETF	XLF	Financial Select Sector SPDR Fund	Equity: U.S. Financials	194	2,260,554,267.05	0.40%	12.67%
ETF	GLD	SPDR Gold Trust	Commodities: Precious Metals Gold	175	1,526,620,844.88	0.27%	12.94%
ETF	EFA	iShares MSCI EAFE ETF	Equity: Developed Markets Ex-U.S. - Total Market	189	1,424,179,878.12	0.25%	13.19%
ETF	IEMG	iShares Core MSCI Emerging Markets ETF	Equity: Emerging Markets - Total Market	151	1,247,314,540.08	0.22%	13.41%
ETF	MDY	SPDR S&P Midcap 400 ETF Trust	Equity: U.S. - Mid Cap	126	1,147,582,689.83	0.20%	13.61%
ETF	VEA	Vanguard FTSE Developed Markets ETF	Equity: Developed Markets Ex-U.S. - Total Market	184	1,062,613,147.97	0.19%	13.79%
ETF	LQD	iShares iBoxx \$ Investment Grade Corporate Bond ETF	Fixed Income: U.S. - Corporate Investment Grade	142	943,082,705.30	0.17%	13.96%
ETF	BND	Vanguard Total Bond Market ETF	Fixed Income: U.S. - Broad Market Investment Grade	193	936,609,179.48	0.16%	14.12%
ETF	VCSH	Vanguard Short-Term Corporate Bond ETF	Fixed Income: U.S. - Corporate Investment Grade Short-Term	122	821,030,818.77	0.14%	14.27%
ETF	IVV	iShares Core S&P 500 ETF	Equity: U.S. - Large Cap	152	769,310,589.75	0.13%	14.40%
ETF	IEFA	iShares Core MSCI EAFE ETF	Equity: Developed Markets Ex-U.S. - Total Market	145	720,524,089.69	0.13%	14.53%
ETF	IJH	iShares Core S&P Mid-Cap ETF	Equity: U.S. - Mid Cap	148	505,459,353.98	0.09%	14.62%
ETF	VOO	Vanguard S&P 500 ETF	Equity: U.S. - Large Cap	161	419,307,452.39	0.07%	14.69%
ETF	BSV	Vanguard Short-Term Bond ETF	Fixed Income: U.S. - Government/Credit Investment Grade Short-Term	186	387,757,381.97	0.07%	14.76%
ETF	AGG	iShares Core U.S. Aggregate Bond ETF	Fixed Income: U.S. - Broad Market Investment Grade	150	339,421,627.17	0.06%	14.82%
ETF	VNQ	Vanguard REIT ETF	Equity: U.S. Real Estate	183	334,225,134.32	0.06%	14.88%
ETF	VTI	Vanguard Total Stock Market ETF	Equity: U.S. - Total Market	207	261,301,979.16	0.05%	14.92%
ETF	VUG	Vanguard Growth ETF	Equity: U.S. - Large Cap Growth	157	249,862,008.03	0.04%	14.97%
ETF	IJR	iShares Core S&P Small Cap ETF	Equity: U.S. - Small Cap	163	156,236,791.99	0.03%	14.99%
ETF	IWD	iShares Russell 1000 Value ETF	Equity: U.S. - Large Cap Value	161	150,411,294.44	0.03%	15.02%
ETF	IWF	iShares Russell 1000 Growth ETF	Equity: U.S. - Large Cap Growth	142	148,822,150.60	0.03%	15.05%
ETF	VIG	Vanguard Dividend Appreciation ETF	Equity: U.S. - Total Market	191	109,722,089.19	0.02%	15.07%
ETF	TIP	iShares TIPS Bond ETF	Fixed Income: U.S. Government TIPS	127	106,362,589.59	0.02%	15.08%
ETF	VTV	Vanguard Value ETF	Equity: U.S. - Large Cap Value	127	82,397,052.61	0.01%	15.10%
ETF	VO	Vanguard Mid-Cap ETF	Equity: U.S. - Mid Cap	100	81,383,332.70	0.01%	15.11%
Total Value of Fails-to-Deliver of 30 Largest Exchange Traded Funds Securities					86,144,667,146.71	15.11%	15.11%
Total Value of Fails-to-Deliver of All Other Securities					483,843,586,765.44	84.89%	84.89%
Total Value of Fails-to-Deliver of All Securities					569,988,253,912.15	100.00%	100.00%
Number of Distinct Security Symbols Reported					15,178		

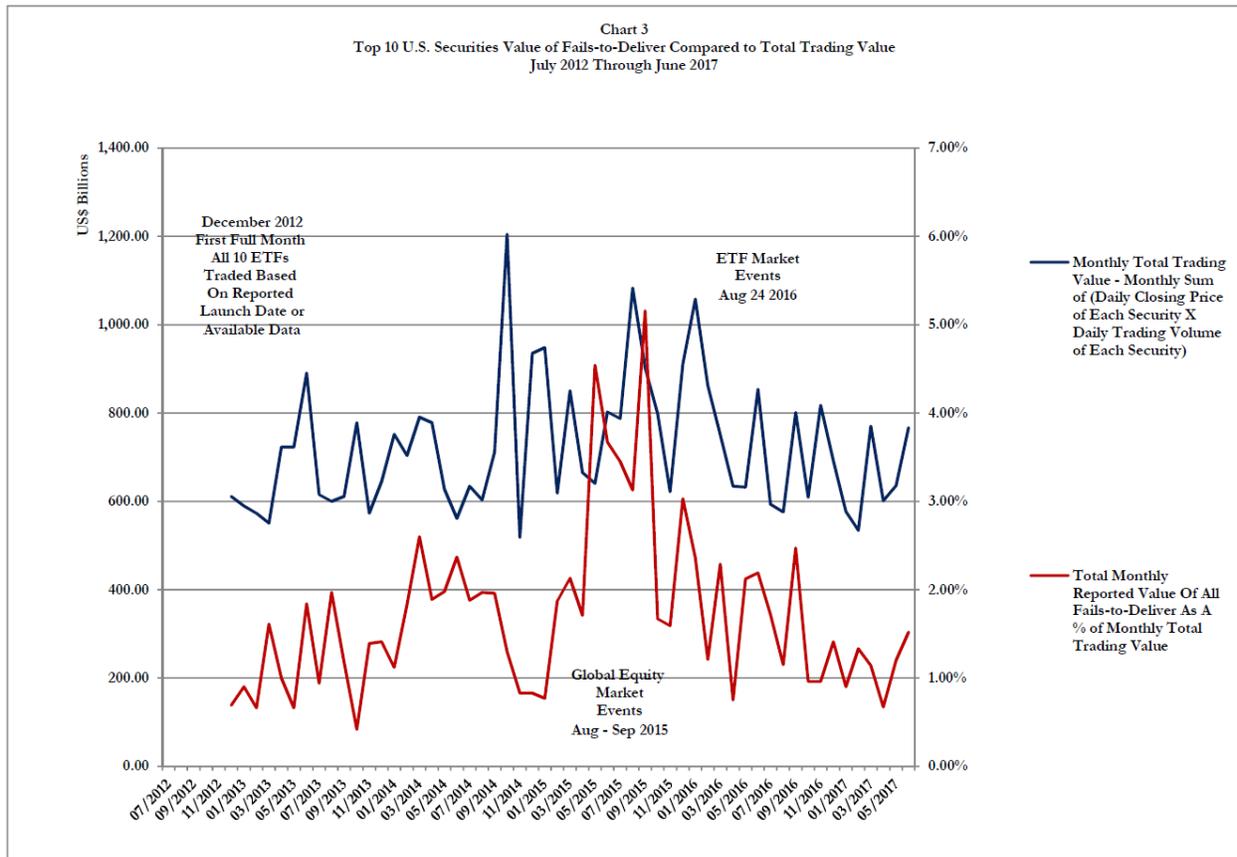
Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC.

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### Trading and Fails-to-Deliver - Differences

The concentration of fails-to-deliver is one factor of market settlement operational risk. The relationship and volatility of fails-to-deliver value to the trading value are also important factors of market settlement operational risk.

The Top 10 fails-to-deliver securities for the fiscal year ending June 30, 2017 are all ETFs; none are listed equity securities on this list. The ETFs in the Top 10 fails-to-deliver list are based on a variety of securities with different market and actual settlement liquidity profiles. Chart 3 reveals the Top 10 fails-to-deliver securities trading and fails-to-deliver history. This shows that the fails-to-deliver history is significantly higher than the 0.50% to 1.50% percentage history of total fails-to-deliver value to the Daily Total Notional Value Traded shown in Chart 1. During the global equity market event of August and September 2015, trading value spiked and fails-to-deliver values rose to over 5.00% of the total trading value. Chart 3 demonstrates actual liquidity of these 10 ETFs was stressed to satisfy settlement liquidity obligations created by market liquidity during this global market event.

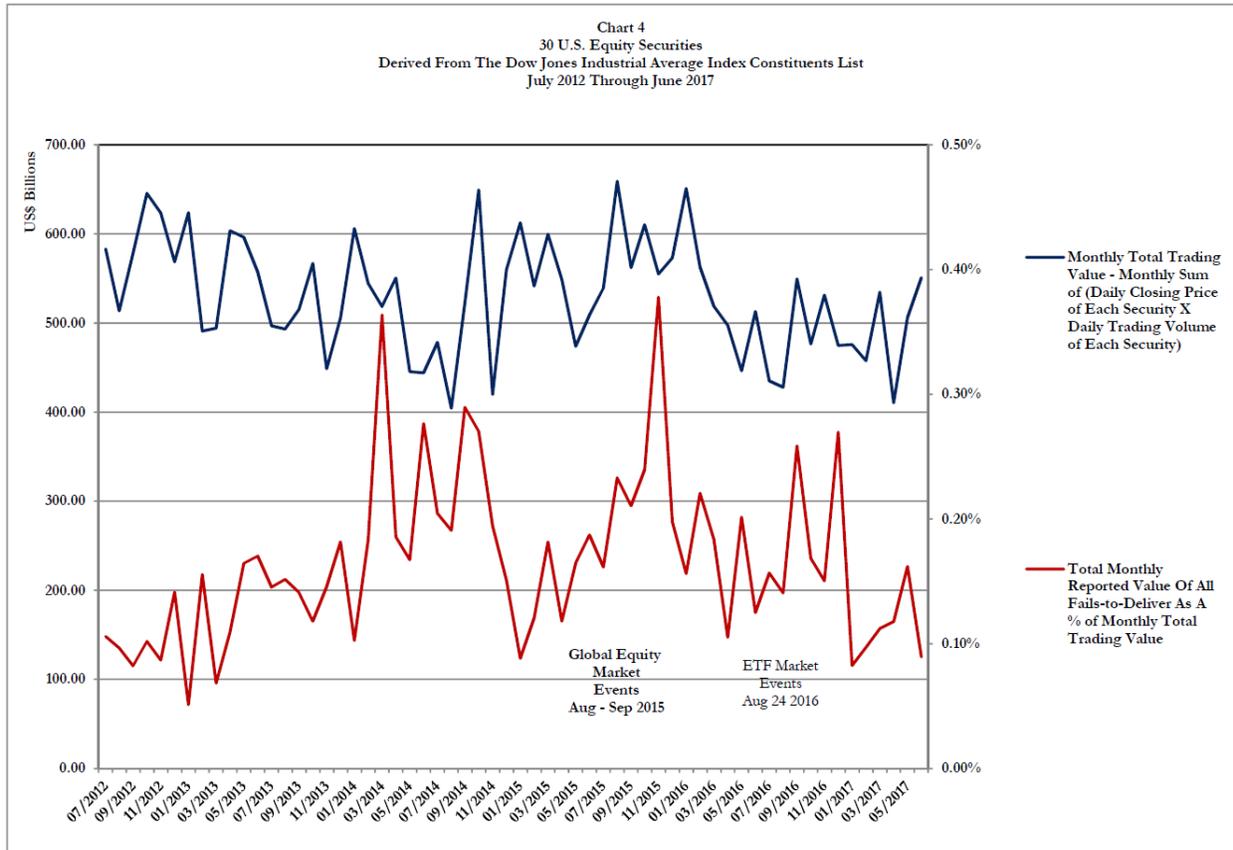


Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC.

Chart 4 presents a 5-year trading and fails-to-deliver history ending June 30, 2017 of the 30 listed equity securities derived from the Dow Jones Industrial Average Index. The Dow Jones Industrial Average Index group of 30 listed equity securities is regarded as liquid to very liquid. Chart 4

## ETF Discussion OpsRisk Limited

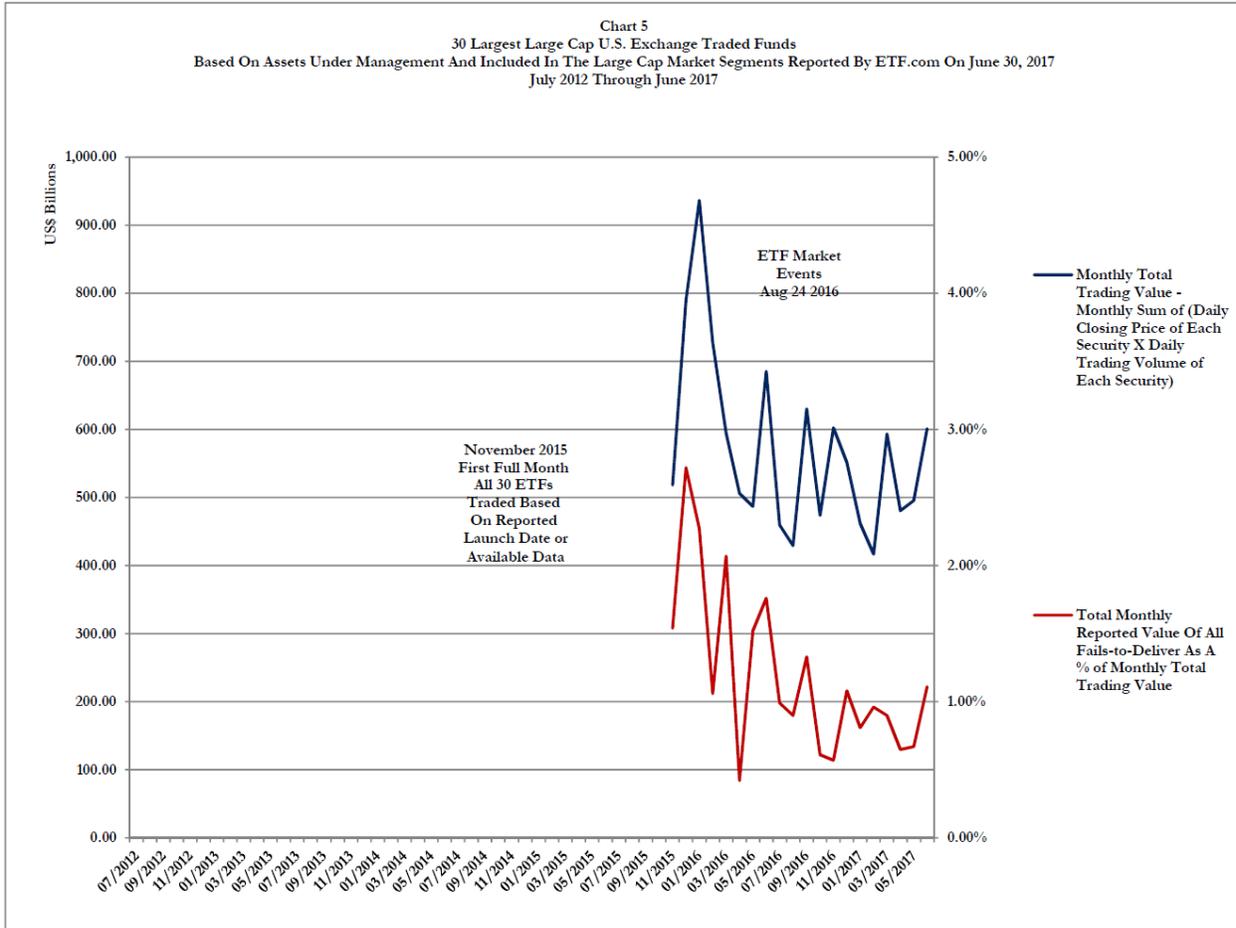
indicates that in general, total reported fails-to-deliver value as a percentage of daily total trading value is less than 0.25%. During the global equity market turmoil August-September 2015, fails-to-deliver spiked to the 0.40% range. Chart 4 reveals real liquidity of these 30 securities was actually stressed significantly less during this global market event than for the 10 ETFs included in the Top 10 fails-to-deliver securities list.



Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC.

Narrowing the focus, the trading and fails-to-deliver history of the 30 largest ETFs included in the large cap market segments as reported by ETF.com on June 30, 2017 is reported in Chart 5. The 30 largest ETFs included in the large cap market segments are based on equity securities generally considered to be liquid or very liquid. November 2015 is the first full month all 30 large cap ETFs traded based on launch date or available data. Chart 5 shows the total trading value generally in the same range as for the Dow Jones Industrial Average Index group. Even with the shorter comparison period, Chart 5 demonstrates the total reported fails-to-deliver value as a percentage of total trading value is much higher than the Dow Jones Industrial Average Index group.

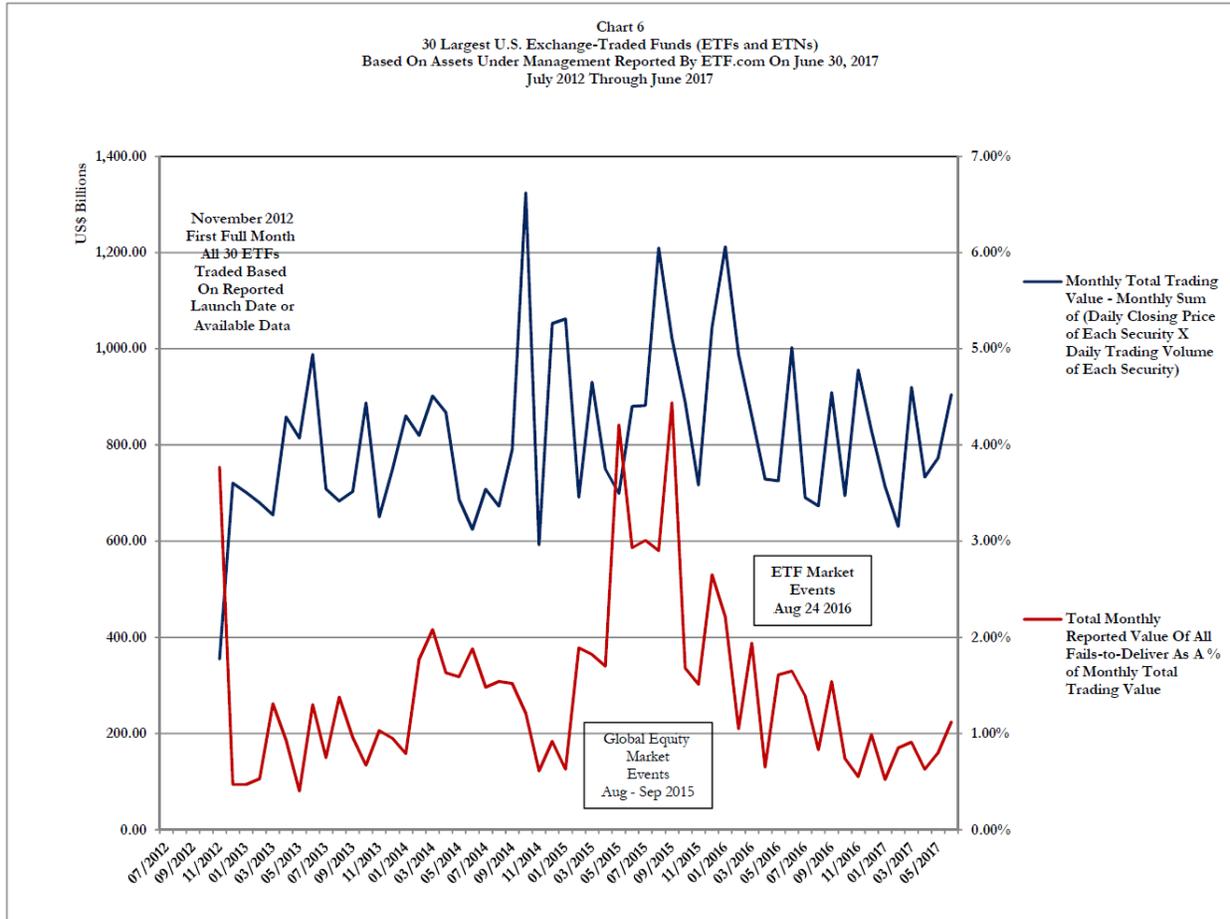
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Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC.

The 30 largest ETFs identified as a representative group that might be considered to be blue chip ETFs are based on equity, fixed income, and commodity market securities. A variety of securities with different market and actual settlement liquidity profiles are represented in the group. Chart 6 demonstrates the volatility in fails-to-deliver for the group. Chart 6 indicates a range of total reported fails-to-deliver value as a percentage of daily total trading value of 0.50% to a fails-to-deliver spike to the 4.25% range during the global equity market turmoil August-September 2015. Actual liquidity of these 30 securities was stressed significantly greater than the Dow Jones Industrial Average Index group of 30 securities in this global market event.

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Sources: U.S. Securities and Exchange Commission, New York Stock Exchange, The Depository Trust and Clearing Corporation, Nasdaq, Inc., Yahoo! Finance, Bloomberg L.P., ETF.com/IndexUniverse LLC.

### Points for Consideration

The available operational metrics indicate exchange traded securities, ETFs, are not as efficient and effective as the Dow Jones Industrial Average Index group of 30 listed equity securities in converting market liquidity into actual liquidity to match settlement liquidity obligations.

The operational data available from the SEC/NSCC data omits fails-to-deliver data from exchanging, internalized, or “special securities transactions” operational processes. The SEC/NSCC data can only serve as a “canary in the coal mine.” The available operational data history across ETFs does suggest the following points for consideration:

- Do the unique ETF operational responsibilities carry an operational overhead which creates an operational risk not found with listed equity securities?
- Might APs with operational responsibilities and no legal obligation to create or redeem ETF shares, create a very different, undisclosed operational risk?
- What factors in the trading, short-selling, securities lending, or creation and redemption operational processes create the differences between ETFs and listed equity securities which share a common, operationally efficient electronic trading, clearance, and settlement market?

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- What market trading, operational processes and ETF operational responsibilities cause the settlement liquidity difference between the large cap based ETF group and the blue chip based ETF group?
- Might fails-to-deliver concentrated in a small number of ETFs impose a disproportionate weight on market processes and actual market liquidity?
- Might the ETF fails-to-deliver which are in a concentrated group produce “false positives” or “false negatives” in regulatory compliance, risk and management systems, and trade algorithms and decision support data?
- What is the downstream cash “daisy chain” effect (operational and financial distress or benefit) that results from the ETF fails-to-deliver volatility and concentration?
- Does the quality of collateral, reported as "actually" held, that is based on ETFs require closer inspection?
- Might accounting and risk “netting” obscure actual capital-at-risk due to these concentrated and volatile ETF operational events?

Thank you for your time and consideration.

Fred E. Sommers, President

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