

Nasdaq PHLX, LLC ("PHLX") Nonstandard Expiration Pilot Program

NDXP

Annual Report

As part of the Pilot Program, the Exchange submits this Pilot Program report to the Commission (the "annual report"). The annual report contains an analysis of volume, open interest and trading patterns. In addition, for series that exceed certain minimum open interest parameters, the annual report will provide analysis of index price volatility and, if needed, share trading activity. The annual report is provided to the Commission on a confidential basis.

To date Nasdaq has not listed any end of month (EOM) nonstandard NDXP options. All NDXP data included in this report reflects only weekly expirations, except 3rd Friday. Data are consolidated across all exchanges that trade the products.

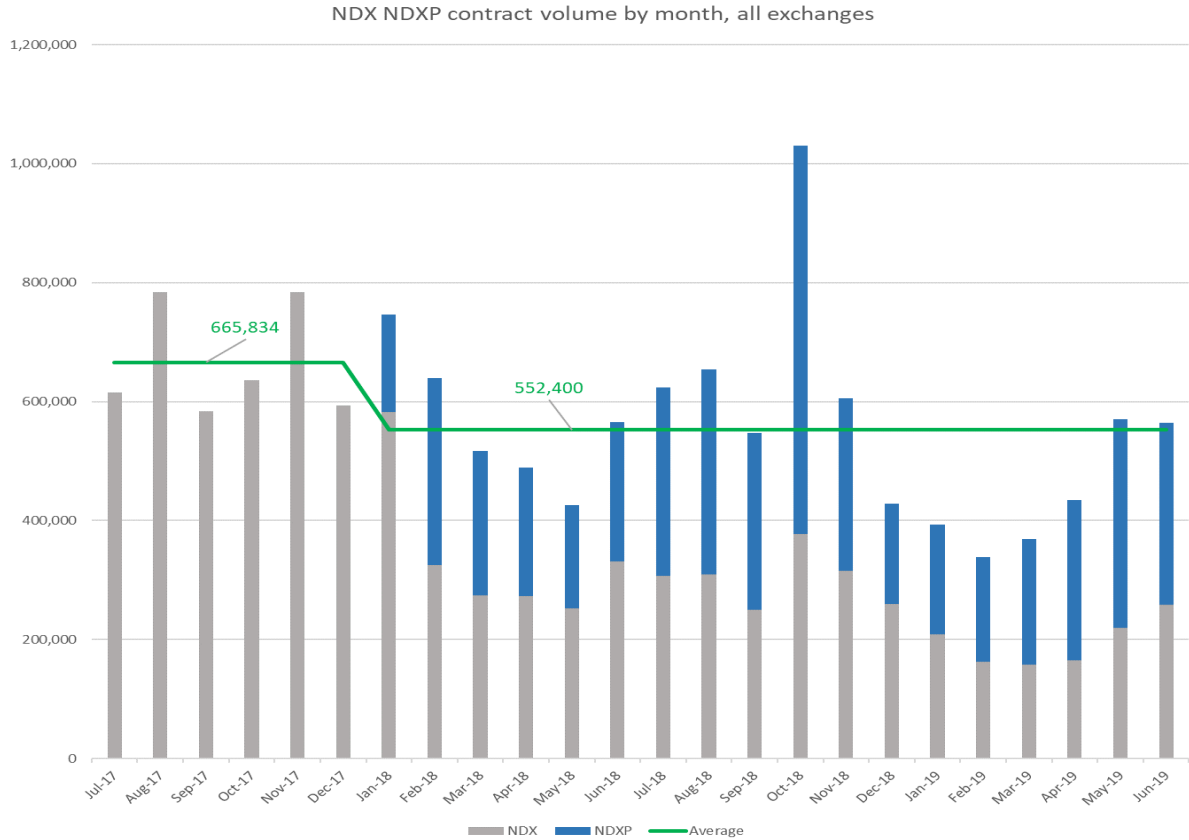
Analysis of Volume and Open Interest

For all weekly nonstandard expirations series (NDXP), this annual report provides volume and open interest data for each broad-based index overlying weekly expiration options.

In addition, the annual report contains the information noted for standard expiration Friday, a.m.-settled series (NDX), for the period covered in the annual report as well as for the six-month period prior to the initiation of the Pilot Program.

(1) Monthly volume aggregated for all Weekly Expiration series

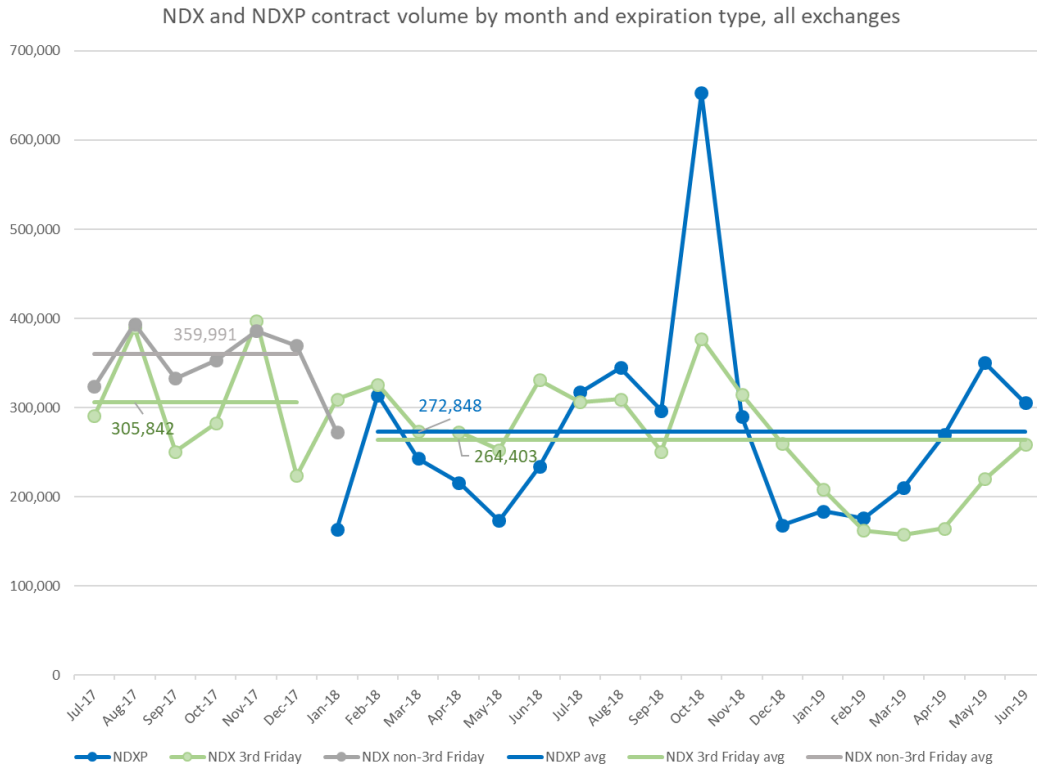
After the introduction of NDXP (January 2018), monthly volume for the class (NDX and NDXP) fell from 665,834 contracts per month to 552,400 contracts per month, a 17% decline.



Contract volume by month, all exchanges				
Month	NDX	NDXP	Total	Average
Jul-17	614,878	0	614,878	665,834
Aug-17	783,976	0	783,976	665,834
Sep-17	583,680	0	583,680	665,834
Oct-17	635,576	0	635,576	665,834
Nov-17	783,388	0	783,388	665,834
Dec-17	593,504	0	593,504	665,834
Jan-18	582,456	163,990	746,446	552,400
Feb-18	325,908	314,060	639,968	552,400
Mar-18	273,912	243,016	516,928	552,400
Apr-18	272,914	216,280	489,194	552,400
May-18	252,708	173,304	426,012	552,400
Jun-18	331,264	234,098	565,362	552,400
Jul-18	306,550	317,458	624,008	552,400
Aug-18	309,646	344,652	654,298	552,400
Sep-18	250,670	296,606	547,276	552,400
Oct-18	377,344	652,938	1,030,282	552,400
Nov-18	315,196	290,364	605,560	552,400
Dec-18	259,708	168,512	428,220	552,400
Jan-19	208,812	184,052	392,864	552,400
Feb-19	162,460	176,038	338,498	552,400
Mar-19	158,070	210,788	368,858	552,400
Apr-19	164,796	269,488	434,284	552,400
May-19	220,350	350,224	570,574	552,400
Jun-19	259,164	305,398	564,562	552,400

Volume Jul 1, 2017 - Jun 30, 2019

Before the introduction of NDXP, NDX volume included regular Friday expirations as well as 3rd Friday expirations. Nasdaq discontinued regular Friday expirations of NDX after NDXP was introduced. Regular Friday expirations of NDX averaged 359,991 contracts per month in the 6 months before they were discontinued. Since introduction, NDXP has averaged 272,848 contracts per month, 24% below the level for NDX regular Friday expirations. NDX 3rd Friday expirations declined slightly from 305,842 contracts per month to 264,403 contracts per month, a 14% decline.



NDX and NDXP volume by month, by expiration type, all exchanges

Month	NDXP	NDX 3rd Friday	NDX non-3rd Friday
Jul-17		290,888	323,990
Aug-17		389,880	394,096
Sep-17		250,674	333,006
Oct-17		282,576	353,000
Nov-17		397,218	386,170
Dec-17		223,818	369,686
Jan-18	163,990	309,790	272,666
Feb-18	314,060	325,908	
Mar-18	243,016	273,912	
Apr-18	216,280	272,914	
May-18	173,304	252,708	
Jun-18	234,098	331,264	
Jul-18	317,458	306,550	
Aug-18	344,652	309,646	
Sep-18	296,606	250,670	
Oct-18	652,938	377,344	
Nov-18	290,364	315,196	
Dec-18	168,512	259,708	
Jan-19	184,052	208,812	
Feb-19	176,038	162,460	
Mar-19	210,788	158,070	
Apr-19	269,488	164,796	
May-19	350,224	220,350	
Jun-19	305,398	259,164	

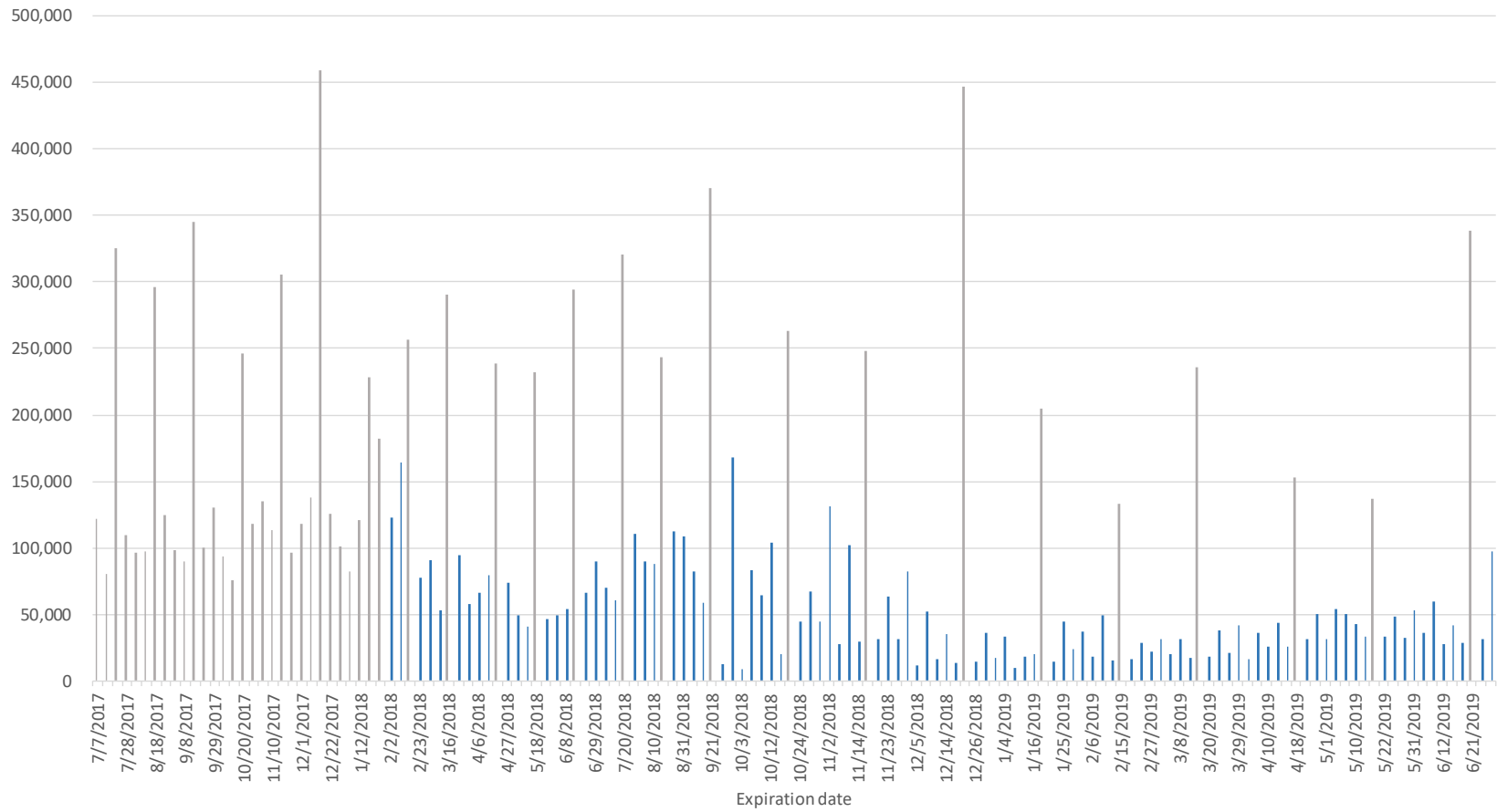
Volume Jul 1, 2017 - Jun 30, 2019

(2) Volume in Weekly Expiration series aggregated by expiration date

NDXP contract volume by expiration date			NDX 3rd Friday contract volume by expiration date			NDX non-3rd Friday contract volume by expiration date		
Expiration date	NDXP	Expiration day	Expiration date	NDX	Expiration day	Expiration date	NDX	Expiration day
2/2/2018	122,948	Friday	7/21/2017	325,300	3rd Friday	7/7/2017	121,716	Friday
2/9/2018	163,880	Friday	8/18/2017	296,352	3rd Friday	7/14/2017	80,228	Friday
2/23/2018	77,960	Friday	9/15/2017	345,250	3rd Friday	7/28/2017	109,454	Friday
3/2/2018	90,830	Friday	10/20/2017	246,100	3rd Friday	8/4/2017	95,942	Friday
3/9/2018	53,206	Friday	11/17/2017	305,468	3rd Friday	8/11/2017	97,736	Friday
3/23/2018	94,770	Friday	12/15/2017	459,208	3rd Friday	8/25/2017	124,484	Friday
3/29/2018	58,116	Thursday	1/19/2018	228,008	3rd Friday	9/1/2017	98,544	Friday
4/6/2018	65,810	Friday	2/16/2018	256,190	3rd Friday	9/8/2017	90,122	Friday
4/13/2018	78,978	Friday	3/16/2018	290,100	3rd Friday	9/22/2017	99,730	Friday
4/27/2018	73,536	Friday	4/20/2018	238,940	3rd Friday	9/29/2017	129,980	Friday
5/4/2018	49,740	Friday	5/18/2018	232,476	3rd Friday	10/6/2017	93,314	Friday
5/11/2018	41,220	Friday	6/15/2018	294,288	3rd Friday	10/13/2017	75,248	Friday
5/25/2018	46,416	Friday	7/20/2018	321,010	3rd Friday	10/27/2017	117,896	Friday
6/1/2018	49,484	Friday	8/17/2018	243,408	3rd Friday	11/3/2017	135,036	Friday
6/8/2018	54,170	Friday	9/21/2018	370,976	3rd Friday	11/10/2017	113,578	Friday
6/22/2018	66,368	Friday	10/19/2018	263,136	3rd Friday	11/24/2017	95,948	Friday
6/29/2018	90,040	Friday	11/16/2018	248,076	3rd Friday	12/1/2017	118,188	Friday
7/6/2018	69,942	Friday	12/21/2018	446,776	3rd Friday	12/8/2017	138,314	Friday
7/13/2018	60,350	Friday	1/18/2019	204,622	3rd Friday	12/22/2017	126,052	Friday
7/27/2018	110,478	Friday	2/15/2019	132,860	3rd Friday	12/29/2017	100,978	Friday
8/3/2018	90,200	Friday	3/15/2019	236,206	3rd Friday	1/5/2018	82,702	Friday
8/19/2018	88,032	Friday	4/18/2019	153,024	3rd Friday	1/12/2018	121,190	Friday
8/24/2018	112,810	Friday	5/17/2019	137,190	3rd Friday	1/26/2018	182,438	Friday
8/31/2018	108,782	Friday	6/21/2019	338,960	3rd Friday	Volume Jan 1, 2017 - Jun 30, 2019		
9/7/2018	82,520	Friday	7/19/2019	95,890	3rd Friday			
9/14/2018	58,738	Friday	8/16/2019	44,694	3rd Friday			
9/26/2018	12,486	Wednesday	9/20/2019	42,598	3rd Friday			
9/28/2018	167,618	Friday	10/18/2019	13,108	3rd Friday			
10/3/2018	8,898	Wednesday	11/15/2019	1,458	3rd Friday			
10/5/2018	82,856	Friday	12/20/2019	69,898	3rd Friday			
10/10/2018	64,626	Wednesday	1/17/2020	4,258	3rd Friday			
10/12/2018	104,182	Friday	2/21/2020	32	3rd Friday			
10/17/2018	20,388	Wednesday	3/20/2020	1,616	3rd Friday			
10/24/2018	44,278	Wednesday	6/19/2020	4,074	3rd Friday			
10/26/2018	67,582	Friday	12/18/2020	10,528	3rd Friday			
10/31/2018	44,538	Wednesday	12/17/2021	3,882	3rd Friday			
11/2/2018	130,996	Friday	Volume Jan 1, 2017 - Jun 30, 2019					
11/7/2018	28,038	Wednesday						
11/9/2018	101,954	Friday						
11/14/2018	29,308	Wednesday						
11/21/2018	31,366	Wednesday						
11/23/2018	63,614	Friday						
11/28/2018	30,974	Wednesday						
11/30/2018	82,364	Friday						
12/5/2018	11,992	Wednesday						
12/7/2018	52,206	Friday						
12/12/2018	16,260	Wednesday						
12/14/2018	34,800	Friday						
12/19/2018	13,846	Wednesday						
12/26/2018	14,688	Wednesday						
12/28/2018	36,080	Friday						
1/2/2019	17,292	Wednesday						
1/4/2019	33,702	Friday						
1/9/2019	10,026	Wednesday						
1/11/2019	18,614	Friday						
1/16/2019	20,344	Wednesday						
1/23/2019	14,118	Wednesday						
1/25/2019	44,470	Friday						
1/30/2019	24,178	Wednesday						
2/1/2019	36,698	Friday						
2/6/2019	18,558	Wednesday						
2/8/2019	48,880	Friday						
2/13/2019	15,386	Wednesday						
2/20/2019	15,928	Wednesday						
2/22/2019	28,444	Friday						
2/27/2019	22,400	Wednesday						
3/1/2019	31,212	Friday						
3/6/2019	19,636	Wednesday						
3/8/2019	31,434	Friday						
3/13/2019	16,852	Wednesday						
3/20/2019	18,286	Wednesday						
3/22/2019	38,236	Friday						
3/27/2019	21,390	Wednesday						
3/29/2019	41,326	Friday						
4/5/2019	15,076	Wednesday						
4/5/2019	36,224	Friday						
4/10/2019	25,344	Wednesday						
4/12/2019	43,806	Friday						
4/17/2019	25,594	Wednesday						
4/24/2019	31,540	Wednesday						
4/26/2019	49,912	Friday						
5/1/2019	31,272	Wednesday						
5/3/2019	54,258	Friday						
5/8/2019	50,286	Wednesday						
5/10/2019	42,832	Friday						
5/15/2019	32,942	Wednesday						
5/22/2019	33,478	Wednesday						
5/24/2019	48,148	Friday						
5/29/2019	32,202	Wednesday						
5/31/2019	53,054	Friday						
6/5/2019	35,776	Wednesday						
6/7/2019	59,508	Friday						
6/13/2019	27,196	Wednesday						
6/14/2019	41,734	Friday						
6/19/2019	28,212	Wednesday						
6/26/2019	31,636	Wednesday						
6/28/2019	97,092	Friday						
7/3/2019	9,382	Wednesday						
7/5/2019	11,726	Friday						
7/10/2019	4,290	Wednesday						
7/12/2019	7,876	Friday						
7/17/2019	1,488	Wednesday						
7/24/2019	1,388	Wednesday						
7/26/2019	2,902	Friday						
7/31/2019	38	Wednesday						
8/2/2019	1,362	Friday						
8/9/2019	20	Friday						

Volume Jan 1, 2017 - Jun 30, 2019

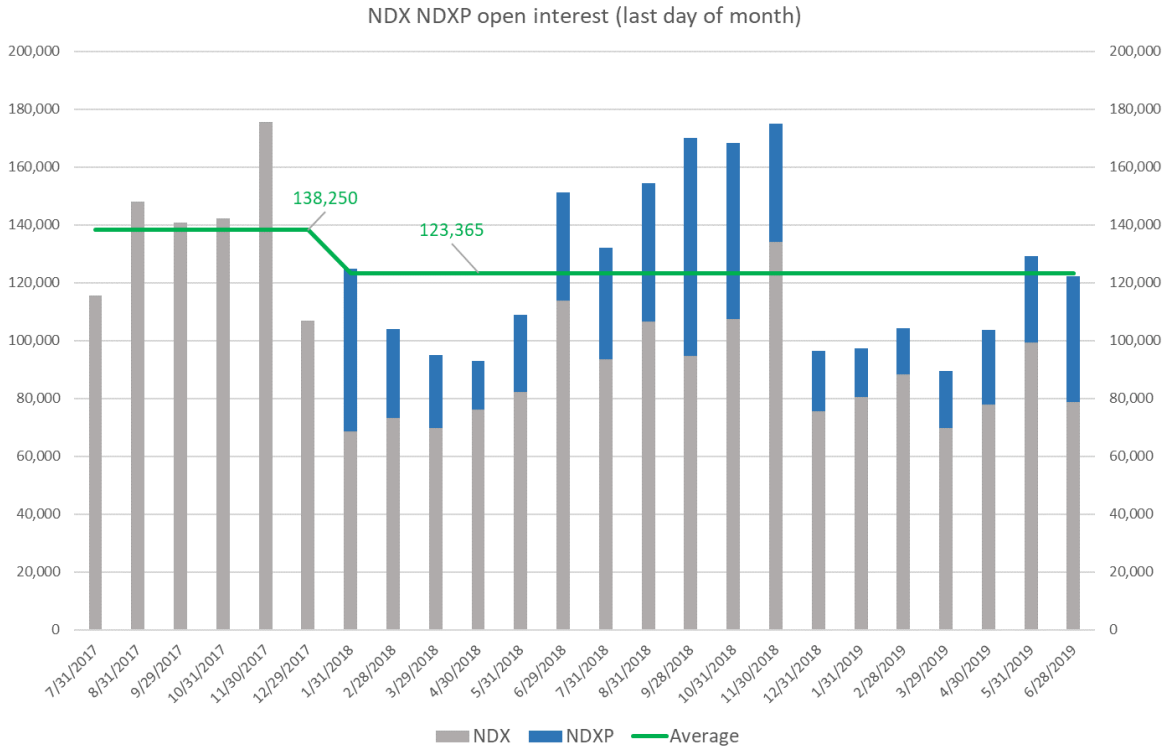
NDX and NDXP contract volume by expiration date



Volume Jan 1, 2017 - Jun 30, 2019

(3) Month-end open interest aggregated for all Weekly Expiration series

After the introduction of NDXP (January 2018), end of month open interest for the class (NDX and NDXP) fell from 138,250 contracts to 123,365 contracts, a 11% decline.



Open interest (last day of month)				
Month	NDX	NDXP	Sum	Avg
7/31/2017	115,491		115,491	138,250
8/31/2017	148,145		148,145	138,250
9/29/2017	140,978		140,978	138,250
10/31/2017	142,374		142,374	138,250
11/30/2017	175,566		175,566	138,250
12/29/2017	106,946		106,946	138,250
1/31/2018	68,543	56,330	124,873	123,365
2/28/2018	73,287	30,879	104,166	123,365
3/29/2018	69,796	25,276	95,072	123,365
4/30/2018	76,090	16,791	92,881	123,365
5/31/2018	82,429	26,626	109,055	123,365
6/29/2018	113,834	37,446	151,280	123,365
7/31/2018	93,721	38,338	132,059	123,365
8/31/2018	106,741	47,646	154,387	123,365
9/28/2018	94,781	75,324	170,105	123,365
10/31/2018	107,545	60,906	168,451	123,365
11/30/2018	134,295	40,710	175,005	123,365
12/31/2018	75,729	20,790	96,519	123,365
1/31/2019	80,582	16,667	97,249	123,365
2/28/2019	88,482	15,940	104,422	123,365
3/29/2019	69,836	19,716	89,552	123,365
4/30/2019	77,819	25,986	103,805	123,365
5/31/2019	99,495	29,858	129,353	123,365
6/28/2019	78,865	43,479	122,344	123,365

(4) Month-end open interest for Weekly Expiration series aggregated by expiration date.

NDXP month end Open interest by expiration date, from Jan 2018 to Sep 2018				NDXP month end Open interest by expiration date, from Oct 2018 to Feb 2019				NDXP month end Open interest by expiration date, from Mar 2019 to Jun 2019			
Month	Expiration	Open interest	Expiration day	Month	Expiration	Open interest	Expiration day	Month	Expiration	Open interest	Expiration day
1/31/2018	2/2/2018	30,512	Friday	10/31/2018	10/31/2018	6,472	Wednesday	3/29/2019	3/29/2019	6,540	Friday
1/31/2018	2/9/2018	20,151	Friday	10/31/2018	11/2/2018	17,431	Friday	3/29/2019	4/3/2019	1,637	Wednesday
1/31/2018	2/23/2018	2,791	Friday	10/31/2018	11/7/2018	4,653	Wednesday	3/29/2019	4/5/2019	5,322	Friday
1/31/2018	3/2/2018	2,681	Friday	10/31/2018	11/9/2018	12,801	Friday	3/29/2019	4/10/2019	614	Wednesday
1/31/2018	3/9/2018	195	Friday	10/31/2018	11/14/2018	5,037	Wednesday	3/29/2019	4/12/2019	2,132	Friday
2/28/2018	3/2/2018	17,327	Friday	10/31/2018	11/21/2018	680	Wednesday	3/29/2019	4/17/2019	468	Wednesday
2/28/2018	3/9/2018	5,364	Friday	10/31/2018	11/23/2018	7,598	Friday	3/29/2019	4/24/2019	500	Wednesday
2/28/2018	3/23/2018	6,007	Friday	10/31/2018	11/28/2018	1,357	Wednesday	3/29/2019	4/26/2019	1,361	Friday
2/28/2018	3/29/2018	2,019	Thursday	10/31/2018	11/30/2018	4,448	Friday	3/29/2019	5/1/2019	25	Wednesday
2/28/2018	4/6/2018	162	Friday	10/31/2018	12/7/2018	429	Friday	3/29/2019	5/3/2019	1,107	Friday
3/29/2018	3/29/2018	9,118	Thursday	11/30/2018	11/30/2018	18,641	Friday	3/29/2019	5/10/2019	10	Friday
3/29/2018	4/6/2018	8,202	Friday	11/30/2018	12/5/2018	2,416	Wednesday	4/30/2019	5/1/2019	8,523	Wednesday
3/29/2018	4/13/2018	4,826	Friday	11/30/2018	12/7/2018	10,533	Friday	4/30/2019	5/3/2019	6,756	Friday
3/29/2018	4/27/2018	2,694	Friday	11/30/2018	12/12/2018	1,232	Wednesday	4/30/2019	5/8/2019	2,358	Wednesday
3/29/2018	5/4/2018	428	Friday	11/30/2018	12/14/2018	2,974	Friday	4/30/2019	5/10/2019	2,596	Friday
3/29/2018	5/11/2018	8	Friday	11/30/2018	12/19/2018	422	Wednesday	4/30/2019	5/15/2019	1,025	Wednesday
4/30/2018	5/4/2018	10,118	Friday	11/30/2018	12/26/2018	324	Wednesday	4/30/2019	5/22/2019	783	Wednesday
4/30/2018	5/11/2018	4,153	Friday	11/30/2018	12/28/2018	1,480	Friday	4/30/2019	5/24/2019	2,200	Friday
4/30/2018	5/25/2018	1,529	Friday	11/30/2018	1/2/2019	1,177	Wednesday	4/30/2019	5/29/2019	587	Wednesday
4/30/2018	6/1/2018	871	Friday	11/30/2018	1/4/2019	1,486	Friday	4/30/2019	5/31/2019	1,023	Friday
4/30/2018	6/8/2018	120	Friday	11/30/2018	1/11/2019	25	Friday	4/30/2019	6/5/2019	2	Wednesday
5/31/2018	6/1/2018	11,836	Friday	12/31/2018	1/2/2019	5,765	Wednesday	4/30/2019	6/7/2019	133	Friday
5/31/2018	6/8/2018	8,494	Friday	12/31/2018	1/4/2019	6,778	Friday	5/31/2019	5/31/2019	10,479	Friday
5/31/2018	6/22/2018	2,732	Friday	12/31/2018	1/9/2019	740	Wednesday	5/31/2019	6/5/2019	2,389	Wednesday
5/31/2018	6/29/2018	3,183	Friday	12/31/2018	1/11/2019	1,814	Friday	5/31/2019	6/7/2019	3,716	Friday
5/31/2018	7/6/2018	369	Friday	12/31/2018	1/16/2019	1,479	Wednesday	5/31/2019	6/12/2019	607	Wednesday
5/31/2018	7/13/2018	12	Friday	12/31/2018	1/23/2019	273	Wednesday	5/31/2019	6/14/2019	2,508	Friday
6/29/2018	6/29/2018	15,734	Friday	12/31/2018	1/25/2019	3,233	Friday	5/31/2019	6/19/2019	535	Wednesday
6/29/2018	7/6/2018	10,748	Friday	12/31/2018	1/30/2019	18	Wednesday	5/31/2019	6/26/2019	299	Wednesday
6/29/2018	7/13/2018	5,325	Friday	12/31/2018	2/1/2019	635	Friday	5/31/2019	6/28/2019	9,018	Friday
6/29/2018	7/27/2018	4,297	Friday	12/31/2018	2/8/2019	55	Friday	5/31/2019	7/3/2019	52	Wednesday
6/29/2018	8/3/2018	1,307	Friday	1/31/2019	2/1/2019	6,273	Friday	5/31/2019	7/5/2019	193	Friday
6/29/2018	8/10/2018	35	Friday	1/31/2019	2/6/2019	1,283	Wednesday	5/31/2019	7/12/2019	62	Friday
7/31/2018	8/3/2018	18,696	Friday	1/31/2019	2/8/2019	3,356	Friday	6/28/2019	6/28/2019	29,928	Friday
7/31/2018	8/10/2018	8,841	Friday	1/31/2019	2/13/2019	572	Wednesday	6/28/2019	7/3/2019	3,088	Wednesday
7/31/2018	8/24/2018	3,975	Friday	1/31/2019	2/20/2019	414	Wednesday	6/28/2019	7/5/2019	3,694	Friday
7/31/2018	8/31/2018	6,013	Friday	1/31/2019	2/22/2019	2,598	Friday	6/28/2019	7/10/2019	1,405	Wednesday
7/31/2018	9/7/2018	813	Friday	1/31/2019	2/27/2019	351	Wednesday	6/28/2019	7/12/2019	2,656	Friday
8/31/2018	8/31/2018	18,397	Friday	1/31/2019	3/1/2019	1,040	Friday	6/28/2019	7/17/2019	526	Wednesday
8/31/2018	9/7/2018	13,794	Friday	1/31/2019	3/6/2019	14	Wednesday	6/28/2019	7/24/2019	664	Wednesday
8/31/2018	9/14/2018	5,625	Friday	1/31/2019	3/8/2019	734	Friday	6/28/2019	7/26/2019	990	Friday
8/31/2018	9/28/2018	8,908	Friday	1/31/2019	3/22/2019	32	Friday	6/28/2019	7/31/2019	11	Wednesday
8/31/2018	10/5/2018	861	Friday	2/28/2019	3/1/2019	6,207	Friday	6/28/2019	8/2/2019	507	Friday
8/31/2018	10/12/2018	61	Friday	2/28/2019	3/6/2019	2,605	Wednesday	6/28/2019	8/9/2019	10	Friday
9/28/2018	9/28/2018	56,006	Friday	2/28/2019	3/8/2019	3,625	Friday				
9/28/2018	10/3/2018	821	Wednesday	2/28/2019	3/13/2019	472	Wednesday				
9/28/2018	10/5/2018	7,473	Friday	2/28/2019	3/20/2019	304	Wednesday				
9/28/2018	10/10/2018	1,327	Wednesday	2/28/2019	3/22/2019	1,125	Friday				
9/28/2018	10/12/2018	5,086	Friday	2/28/2019	3/27/2019	189	Wednesday				
9/28/2018	10/17/2018	83	Wednesday	2/28/2019	3/29/2019	1,213	Friday				
9/28/2018	10/24/2018	357	Wednesday	2/28/2019	4/3/2019	4	Wednesday				
9/28/2018	10/26/2018	2,948	Friday	2/28/2019	4/5/2019	186	Friday				
9/28/2018	10/31/2018	645	Wednesday	2/28/2019	4/12/2019	10	Friday				
9/28/2018	11/2/2018	532	Friday								
9/28/2018	11/9/2018	46	Friday								

NDX month end Open interest by expiration date (3rd Friday),
from Jul 2017 to Nov 2017

Month	Expiration date	Open interest	Expiration day
7/31/2017	8/18/2017	24,113	3rd Friday
7/31/2017	9/15/2017	27,981	3rd Friday
7/31/2017	10/20/2017	2,492	3rd Friday
7/31/2017	11/17/2017	456	3rd Friday
7/31/2017	12/15/2017	15,111	3rd Friday
7/31/2017	3/16/2018	1,442	3rd Friday
7/31/2017	6/15/2018	4,039	3rd Friday
7/31/2017	12/21/2018	2,300	3rd Friday
7/31/2017	12/20/2019	550	3rd Friday
8/31/2017	9/15/2017	50,869	3rd Friday
8/31/2017	10/20/2017	13,347	3rd Friday
8/31/2017	11/17/2017	4,977	3rd Friday
8/31/2017	12/15/2017	17,262	3rd Friday
8/31/2017	1/19/2018	27	3rd Friday
8/31/2017	3/16/2018	2,010	3rd Friday
8/31/2017	6/15/2018	4,338	3rd Friday
8/31/2017	12/21/2018	2,370	3rd Friday
8/31/2017	12/20/2019	689	3rd Friday
9/29/2017	10/20/2017	26,116	3rd Friday
9/29/2017	11/17/2017	14,929	3rd Friday
9/29/2017	12/15/2017	21,838	3rd Friday
9/29/2017	1/19/2018	733	3rd Friday
9/29/2017	2/16/2018	203	3rd Friday
9/29/2017	3/16/2018	2,439	3rd Friday
9/29/2017	6/15/2018	4,441	3rd Friday
9/29/2017	12/21/2018	2,698	3rd Friday
9/29/2017	12/20/2019	753	3rd Friday
10/31/2017	11/17/2017	34,944	3rd Friday
10/31/2017	12/15/2017	38,954	3rd Friday
10/31/2017	1/19/2018	1,640	3rd Friday
10/31/2017	2/16/2018	572	3rd Friday
10/31/2017	3/16/2018	2,885	3rd Friday
10/31/2017	4/20/2018	88	3rd Friday
10/31/2017	5/18/2018	24	3rd Friday
10/31/2017	6/15/2018	4,523	3rd Friday
10/31/2017	7/20/2018	34	3rd Friday
10/31/2017	9/21/2018	5	3rd Friday
10/31/2017	12/21/2018	3,189	3rd Friday
10/31/2017	1/18/2019	153	3rd Friday
10/31/2017	12/20/2019	804	3rd Friday
11/30/2017	12/15/2017	99,788	3rd Friday
11/30/2017	1/19/2018	7,223	3rd Friday
11/30/2017	2/16/2018	2,958	3rd Friday
11/30/2017	3/16/2018	3,739	3rd Friday
11/30/2017	4/20/2018	152	3rd Friday
11/30/2017	5/18/2018	84	3rd Friday
11/30/2017	6/15/2018	4,648	3rd Friday
11/30/2017	7/20/2018	172	3rd Friday
11/30/2017	8/17/2018	38	3rd Friday
11/30/2017	9/21/2018	72	3rd Friday
11/30/2017	12/21/2018	3,441	3rd Friday
11/30/2017	1/18/2019	203	3rd Friday
11/30/2017	12/20/2019	829	3rd Friday

NDX month end Open interest by expiration date (3rd
Friday), from Dec 2017 to Mar 2018

Month	Expiration	Open interest	Expiration day
12/29/2017	1/19/2018	22,687	3rd Friday
12/29/2017	2/16/2018	5,938	3rd Friday
12/29/2017	3/16/2018	8,704	3rd Friday
12/29/2017	4/20/2018	452	3rd Friday
12/29/2017	5/18/2018	143	3rd Friday
12/29/2017	6/15/2018	4,832	3rd Friday
12/29/2017	7/20/2018	195	3rd Friday
12/29/2017	8/17/2018	67	3rd Friday
12/29/2017	9/21/2018	139	3rd Friday
12/29/2017	10/19/2018	6	3rd Friday
12/29/2017	12/21/2018	3,700	3rd Friday
12/29/2017	1/18/2019	275	3rd Friday
12/29/2017	12/20/2019	1,127	3rd Friday
1/31/2018	2/16/2018	27,891	3rd Friday
1/31/2018	3/16/2018	22,669	3rd Friday
1/31/2018	4/20/2018	3,853	3rd Friday
1/31/2018	5/18/2018	719	3rd Friday
1/31/2018	6/15/2018	5,859	3rd Friday
1/31/2018	7/20/2018	282	3rd Friday
1/31/2018	8/17/2018	130	3rd Friday
1/31/2018	9/21/2018	324	3rd Friday
1/31/2018	10/19/2018	129	3rd Friday
1/31/2018	11/16/2018	38	3rd Friday
1/31/2018	12/21/2018	4,800	3rd Friday
1/31/2018	1/18/2019	503	3rd Friday
1/31/2018	12/20/2019	1,346	3rd Friday
2/28/2018	3/16/2018	40,931	3rd Friday
2/28/2018	4/20/2018	9,311	3rd Friday
2/28/2018	5/18/2018	4,561	3rd Friday
2/28/2018	6/15/2018	8,878	3rd Friday
2/28/2018	7/20/2018	550	3rd Friday
2/28/2018	8/17/2018	247	3rd Friday
2/28/2018	9/21/2018	721	3rd Friday
2/28/2018	10/19/2018	223	3rd Friday
2/28/2018	11/16/2018	70	3rd Friday
2/28/2018	12/21/2018	4,992	3rd Friday
2/28/2018	1/18/2019	1,185	3rd Friday
2/28/2018	12/20/2019	1,618	3rd Friday
3/29/2018	4/20/2018	26,545	3rd Friday
3/29/2018	5/18/2018	12,053	3rd Friday
3/29/2018	6/15/2018	16,271	3rd Friday
3/29/2018	7/20/2018	2,087	3rd Friday
3/29/2018	8/17/2018	1,196	3rd Friday
3/29/2018	9/21/2018	2,357	3rd Friday
3/29/2018	10/19/2018	369	3rd Friday
3/29/2018	11/16/2018	73	3rd Friday
3/29/2018	12/21/2018	5,305	3rd Friday
3/29/2018	1/18/2019	1,590	3rd Friday
3/29/2018	3/15/2019	82	3rd Friday
3/29/2018	6/21/2019	46	3rd Friday
3/29/2018	12/20/2019	1,822	3rd Friday

NDX month end Open interest by expiration date (3rd Friday), from Apr 2018 to Jul 2018

Month	Expiration	Open interest	Expiration day
4/30/2018	5/18/2018	29,138	3rd Friday
4/30/2018	6/15/2018	24,790	3rd Friday
4/30/2018	7/20/2018	5,662	3rd Friday
4/30/2018	8/17/2018	2,113	3rd Friday
4/30/2018	9/21/2018	3,612	3rd Friday
4/30/2018	10/19/2018	520	3rd Friday
4/30/2018	11/16/2018	134	3rd Friday
4/30/2018	12/21/2018	5,684	3rd Friday
4/30/2018	1/18/2019	2,060	3rd Friday
4/30/2018	3/15/2019	323	3rd Friday
4/30/2018	6/21/2019	209	3rd Friday
4/30/2018	12/20/2019	1,727	3rd Friday
4/30/2018	12/18/2020	118	3rd Friday
5/31/2018	6/15/2018	43,176	3rd Friday
5/31/2018	7/20/2018	14,161	3rd Friday
5/31/2018	8/17/2018	4,483	3rd Friday
5/31/2018	9/21/2018	7,608	3rd Friday
5/31/2018	10/19/2018	625	3rd Friday
5/31/2018	11/16/2018	165	3rd Friday
5/31/2018	12/21/2018	6,881	3rd Friday
5/31/2018	1/18/2019	2,642	3rd Friday
5/31/2018	2/15/2019	42	3rd Friday
5/31/2018	3/15/2019	441	3rd Friday
5/31/2018	4/18/2019	1	3rd Friday
5/31/2018	6/21/2019	239	3rd Friday
5/31/2018	12/20/2019	1,802	3rd Friday
5/31/2018	12/18/2020	163	3rd Friday
6/29/2018	7/20/2018	64,387	3rd Friday
6/29/2018	8/17/2018	13,800	3rd Friday
6/29/2018	9/21/2018	18,862	3rd Friday
6/29/2018	10/19/2018	1,244	3rd Friday
6/29/2018	11/16/2018	539	3rd Friday
6/29/2018	12/21/2018	7,465	3rd Friday
6/29/2018	1/18/2019	3,364	3rd Friday
6/29/2018	2/15/2019	115	3rd Friday
6/29/2018	3/15/2019	814	3rd Friday
6/29/2018	4/18/2019	130	3rd Friday
6/29/2018	5/17/2019	22	3rd Friday
6/29/2018	6/21/2019	597	3rd Friday
6/29/2018	12/20/2019	2,187	3rd Friday
6/29/2018	12/18/2020	308	3rd Friday
7/31/2018	8/17/2018	33,476	3rd Friday
7/31/2018	9/21/2018	33,985	3rd Friday
7/31/2018	10/19/2018	5,665	3rd Friday
7/31/2018	11/16/2018	2,055	3rd Friday
7/31/2018	12/21/2018	8,674	3rd Friday
7/31/2018	1/18/2019	3,597	3rd Friday
7/31/2018	2/15/2019	230	3rd Friday
7/31/2018	3/15/2019	1,059	3rd Friday
7/31/2018	4/18/2019	160	3rd Friday
7/31/2018	5/17/2019	31	3rd Friday
7/31/2018	6/21/2019	1,223	3rd Friday
7/31/2018	12/20/2019	3,111	3rd Friday
7/31/2018	12/18/2020	455	3rd Friday

NDX month end Open interest by expiration date (3rd Friday), from Aug 2018 to Nov 2018

Month	Expiration	Open interest	Expiration day
8/31/2018	9/21/2018	48,820	3rd Friday
8/31/2018	10/19/2018	17,184	3rd Friday
8/31/2018	11/16/2018	10,662	3rd Friday
8/31/2018	12/21/2018	14,992	3rd Friday
8/31/2018	1/18/2019	4,054	3rd Friday
8/31/2018	2/15/2019	358	3rd Friday
8/31/2018	3/15/2019	4,125	3rd Friday
8/31/2018	4/18/2019	290	3rd Friday
8/31/2018	5/17/2019	126	3rd Friday
8/31/2018	6/21/2019	2,211	3rd Friday
8/31/2018	10/18/2019	8	3rd Friday
8/31/2018	12/20/2019	3,292	3rd Friday
8/31/2018	12/18/2020	619	3rd Friday
9/28/2018	10/19/2018	34,310	3rd Friday
9/28/2018	11/16/2018	15,768	3rd Friday
9/28/2018	12/21/2018	22,638	3rd Friday
9/28/2018	1/18/2019	5,051	3rd Friday
9/28/2018	2/15/2019	548	3rd Friday
9/28/2018	3/15/2019	4,765	3rd Friday
9/28/2018	4/18/2019	375	3rd Friday
9/28/2018	5/17/2019	182	3rd Friday
9/28/2018	6/21/2019	5,897	3rd Friday
9/28/2018	9/20/2019	68	3rd Friday
9/28/2018	10/18/2019	72	3rd Friday
9/28/2018	12/20/2019	4,444	3rd Friday
9/28/2018	12/18/2020	663	3rd Friday
10/31/2018	11/16/2018	31,732	3rd Friday
10/31/2018	12/21/2018	44,442	3rd Friday
10/31/2018	1/18/2019	8,458	3rd Friday
10/31/2018	2/15/2019	1,255	3rd Friday
10/31/2018	3/15/2019	6,408	3rd Friday
10/31/2018	4/18/2019	1,081	3rd Friday
10/31/2018	5/17/2019	453	3rd Friday
10/31/2018	6/21/2019	7,004	3rd Friday
10/31/2018	7/19/2019	67	3rd Friday
10/31/2018	8/16/2019	27	3rd Friday
10/31/2018	9/20/2019	514	3rd Friday
10/31/2018	10/18/2019	195	3rd Friday
10/31/2018	12/20/2019	5,249	3rd Friday
10/31/2018	12/18/2020	660	3rd Friday
11/30/2018	12/21/2018	86,373	3rd Friday
11/30/2018	1/18/2019	16,798	3rd Friday
11/30/2018	2/15/2019	3,729	3rd Friday
11/30/2018	3/15/2019	8,222	3rd Friday
11/30/2018	4/18/2019	1,344	3rd Friday
11/30/2018	5/17/2019	522	3rd Friday
11/30/2018	6/21/2019	6,562	3rd Friday
11/30/2018	7/19/2019	175	3rd Friday
11/30/2018	8/16/2019	125	3rd Friday
11/30/2018	9/20/2019	714	3rd Friday
11/30/2018	10/18/2019	393	3rd Friday
11/30/2018	12/20/2019	8,634	3rd Friday
11/30/2018	12/18/2020	704	3rd Friday

NDX month end Open interest by expiration date (3rd Friday), from Dec 2018 to Mar 2019

Month	Expiration	Open interest	Expiration day
12/31/2018	1/18/2019	29,716	3rd Friday
12/31/2018	2/15/2019	7,142	3rd Friday
12/31/2018	3/15/2019	15,034	3rd Friday
12/31/2018	4/18/2019	1,929	3rd Friday
12/31/2018	5/17/2019	791	3rd Friday
12/31/2018	6/21/2019	7,739	3rd Friday
12/31/2018	7/19/2019	287	3rd Friday
12/31/2018	8/16/2019	277	3rd Friday
12/31/2018	9/20/2019	1,681	3rd Friday
12/31/2018	10/18/2019	476	3rd Friday
12/31/2018	12/20/2019	9,943	3rd Friday
12/31/2018	12/18/2020	714	3rd Friday
1/31/2019	2/15/2019	20,449	3rd Friday
1/31/2019	3/15/2019	27,668	3rd Friday
1/31/2019	4/18/2019	4,883	3rd Friday
1/31/2019	5/17/2019	1,206	3rd Friday
1/31/2019	6/21/2019	10,472	3rd Friday
1/31/2019	7/19/2019	498	3rd Friday
1/31/2019	8/16/2019	499	3rd Friday
1/31/2019	9/20/2019	2,143	3rd Friday
1/31/2019	10/18/2019	546	3rd Friday
1/31/2019	12/20/2019	10,758	3rd Friday
1/31/2019	1/17/2020	11	3rd Friday
1/31/2019	6/19/2020	215	3rd Friday
1/31/2019	12/18/2020	982	3rd Friday
1/31/2019	12/17/2021	252	3rd Friday
2/28/2019	3/15/2019	41,134	3rd Friday
2/28/2019	4/18/2019	10,796	3rd Friday
2/28/2019	5/17/2019	3,684	3rd Friday
2/28/2019	6/21/2019	13,194	3rd Friday
2/28/2019	7/19/2019	722	3rd Friday
2/28/2019	8/16/2019	575	3rd Friday
2/28/2019	9/20/2019	2,641	3rd Friday
2/28/2019	10/18/2019	696	3rd Friday
2/28/2019	12/20/2019	10,984	3rd Friday
2/28/2019	1/17/2020	150	3rd Friday
2/28/2019	3/20/2020	3	3rd Friday
2/28/2019	6/19/2020	263	3rd Friday
2/28/2019	12/18/2020	3,315	3rd Friday
2/28/2019	12/17/2021	325	3rd Friday
3/29/2019	4/18/2019	21,134	3rd Friday
3/29/2019	5/17/2019	8,578	3rd Friday
3/29/2019	6/21/2019	17,941	3rd Friday
3/29/2019	7/19/2019	1,117	3rd Friday
3/29/2019	8/16/2019	698	3rd Friday
3/29/2019	9/20/2019	3,089	3rd Friday
3/29/2019	10/18/2019	837	3rd Friday
3/29/2019	12/20/2019	10,580	3rd Friday
3/29/2019	1/17/2020	335	3rd Friday
3/29/2019	3/20/2020	258	3rd Friday
3/29/2019	6/19/2020	624	3rd Friday
3/29/2019	12/18/2020	4,142	3rd Friday
3/29/2019	12/17/2021	503	3rd Friday

NDX month end Open interest by expiration date (3rd Friday), from Apr 2019 to Jun 2019

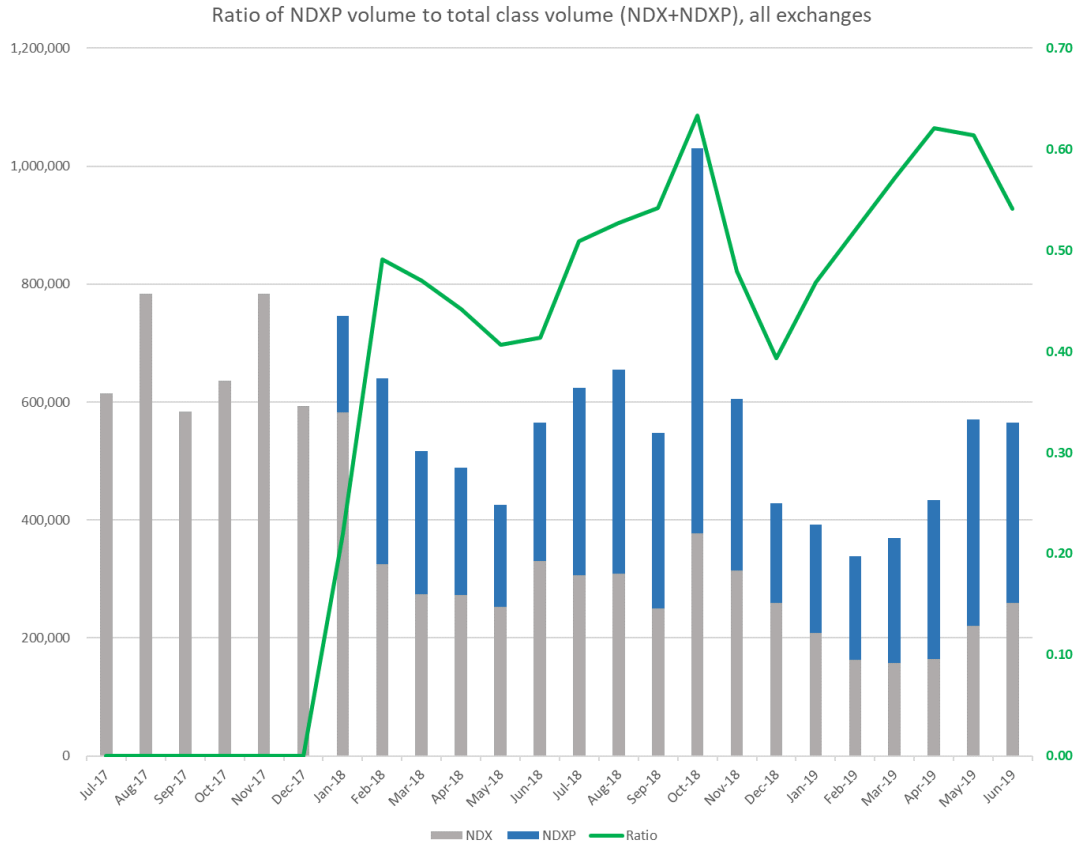
Month	Expiration	Open interest	Expiration day
4/30/2019	5/17/2019	15,811	3rd Friday
4/30/2019	6/21/2019	26,648	3rd Friday
4/30/2019	7/19/2019	5,629	3rd Friday
4/30/2019	8/16/2019	2,215	3rd Friday
4/30/2019	9/20/2019	4,205	3rd Friday
4/30/2019	10/18/2019	1,100	3rd Friday
4/30/2019	11/15/2019	65	3rd Friday
4/30/2019	12/20/2019	14,323	3rd Friday
4/30/2019	1/17/2020	804	3rd Friday
4/30/2019	3/20/2020	421	3rd Friday
4/30/2019	6/19/2020	749	3rd Friday
4/30/2019	12/18/2020	4,216	3rd Friday
4/30/2019	12/17/2021	1,633	3rd Friday
5/31/2019	6/21/2019	44,810	3rd Friday
5/31/2019	7/19/2019	10,554	3rd Friday
5/31/2019	8/16/2019	9,111	3rd Friday
5/31/2019	9/20/2019	6,771	3rd Friday
5/31/2019	10/18/2019	2,431	3rd Friday
5/31/2019	11/15/2019	217	3rd Friday
5/31/2019	12/20/2019	16,693	3rd Friday
5/31/2019	1/17/2020	1,120	3rd Friday
5/31/2019	2/21/2020	13	3rd Friday
5/31/2019	3/20/2020	482	3rd Friday
5/31/2019	6/19/2020	1,272	3rd Friday
5/31/2019	12/18/2020	4,329	3rd Friday
5/31/2019	12/17/2021	1,692	3rd Friday
6/28/2019	7/19/2019	20,808	3rd Friday
6/28/2019	8/16/2019	13,230	3rd Friday
6/28/2019	9/20/2019	13,537	3rd Friday
6/28/2019	10/18/2019	3,954	3rd Friday
6/28/2019	11/15/2019	477	3rd Friday
6/28/2019	12/20/2019	17,039	3rd Friday
6/28/2019	1/17/2020	1,310	3rd Friday
6/28/2019	2/21/2020	16	3rd Friday
6/28/2019	3/20/2020	535	3rd Friday
6/28/2019	6/19/2020	1,838	3rd Friday
6/28/2019	12/18/2020	4,367	3rd Friday
6/28/2019	12/17/2021	1,754	3rd Friday

NDX month end Open interest by expiration date (non-3rd Friday)

Month	Expiration date	Open interest	Expiration day
7/31/2017	8/4/2017	22,646	Friday
7/31/2017	8/11/2017	6,450	Friday
7/31/2017	8/25/2017	4,257	Friday
7/31/2017	9/1/2017	3,485	Friday
7/31/2017	9/8/2017	169	Friday
8/31/2017	9/1/2017	18,582	Friday
8/31/2017	9/8/2017	18,472	Friday
8/31/2017	9/22/2017	5,896	Friday
8/31/2017	9/29/2017	5,307	Friday
8/31/2017	10/6/2017	3,063	Friday
8/31/2017	10/13/2017	936	Friday
9/29/2017	9/29/2017	27,913	Friday
9/29/2017	10/6/2017	21,190	Friday
9/29/2017	10/13/2017	9,234	Friday
9/29/2017	10/27/2017	3,955	Friday
9/29/2017	11/3/2017	3,888	Friday
9/29/2017	11/10/2017	648	Friday
10/31/2017	11/3/2017	31,436	Friday
10/31/2017	11/10/2017	16,405	Friday
10/31/2017	11/24/2017	2,454	Friday
10/31/2017	12/1/2017	3,856	Friday
10/31/2017	12/8/2017	408	Friday
11/30/2017	12/1/2017	21,388	Friday
11/30/2017	12/8/2017	19,469	Friday
11/30/2017	12/22/2017	6,250	Friday
11/30/2017	12/29/2017	4,416	Friday
11/30/2017	1/5/2018	618	Friday
11/30/2017	1/12/2018	78	Friday
12/29/2017	12/29/2017	17,780	Friday
12/29/2017	1/5/2018	17,445	Friday
12/29/2017	1/12/2018	20,212	Friday
12/29/2017	1/26/2018	3,244	Friday

(5) Ratio of monthly aggregate volume in Weekly Expiration series to total monthly class volume.

Ratio of NDXP volume to total class volume (NDX+NDXP), which fluctuated between 40-50% for most of 2018 and 2019, has risen to 63% in October 2018 and fallen to 47% in January 2019.



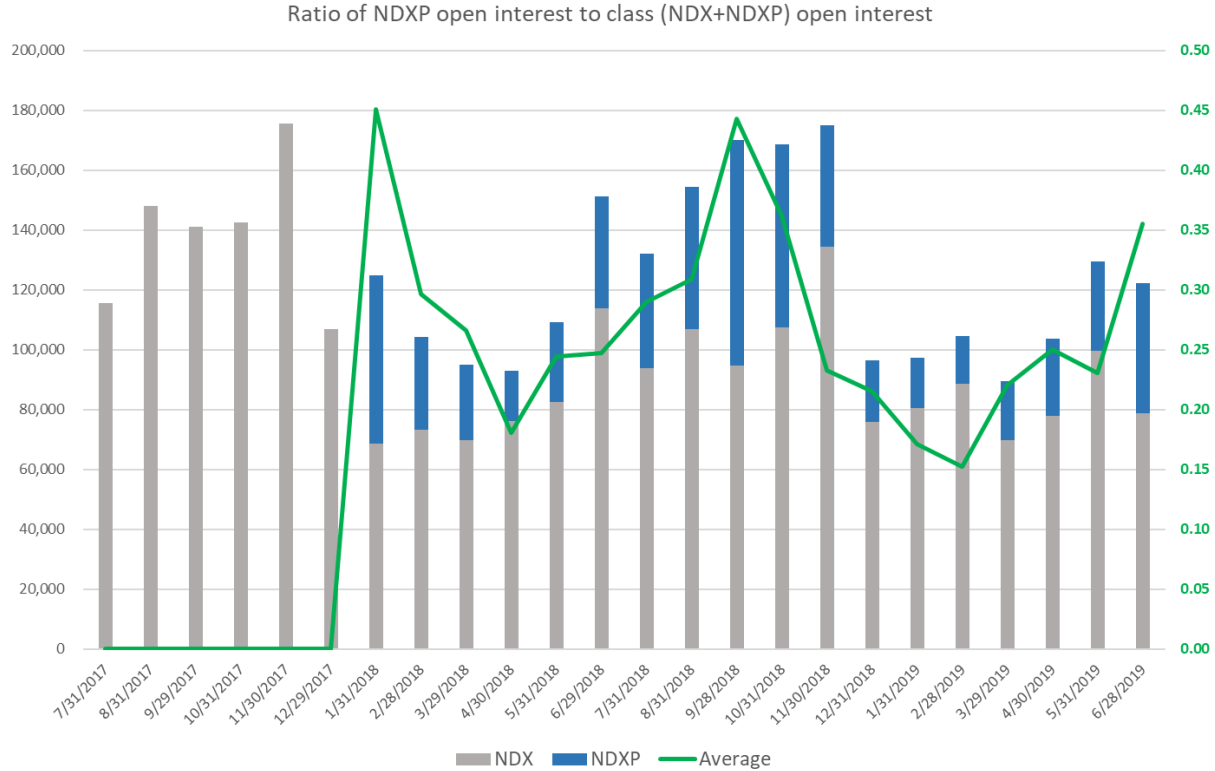
Ratio of NDXP contract volume to class volume

Month	NDX	NDXP	Sum	Ratio
Jul-17	614,878	0	614,878	0.00
Aug-17	783,976	0	783,976	0.00
Sep-17	583,680	0	583,680	0.00
Oct-17	635,576	0	635,576	0.00
Nov-17	783,388	0	783,388	0.00
Dec-17	593,504	0	593,504	0.00
Jan-18	582,456	163,990	746,446	0.22
Feb-18	325,908	314,060	639,968	0.49
Mar-18	273,912	243,016	516,928	0.47
Apr-18	272,914	216,280	489,194	0.44
May-18	252,708	173,304	426,012	0.41
Jun-18	331,264	234,098	565,362	0.41
Jul-18	306,550	317,458	624,008	0.51
Aug-18	309,646	344,652	654,298	0.53
Sep-18	250,670	296,606	547,276	0.54
Oct-18	377,344	652,938	1,030,282	0.63
Nov-18	315,196	290,364	605,560	0.48
Dec-18	259,708	168,512	428,220	0.39
Jan-19	208,812	184,052	392,864	0.47
Feb-19	162,460	176,038	338,498	0.52
Mar-19	158,070	210,788	368,858	0.57
Apr-19	164,796	269,488	434,284	0.62
May-19	220,350	350,224	570,574	0.61
Jun-19	259,164	305,398	564,562	0.54

Volume Jul 1, 2017 - Jun 30, 2019

(6) Ratio of month-end open interest in each Weekly Expiration series to total class open interest.

Ratio of NDXP open interest to total class open interest (NDX+NDXP) has fluctuated widely, peaking at 44% in September 2018.



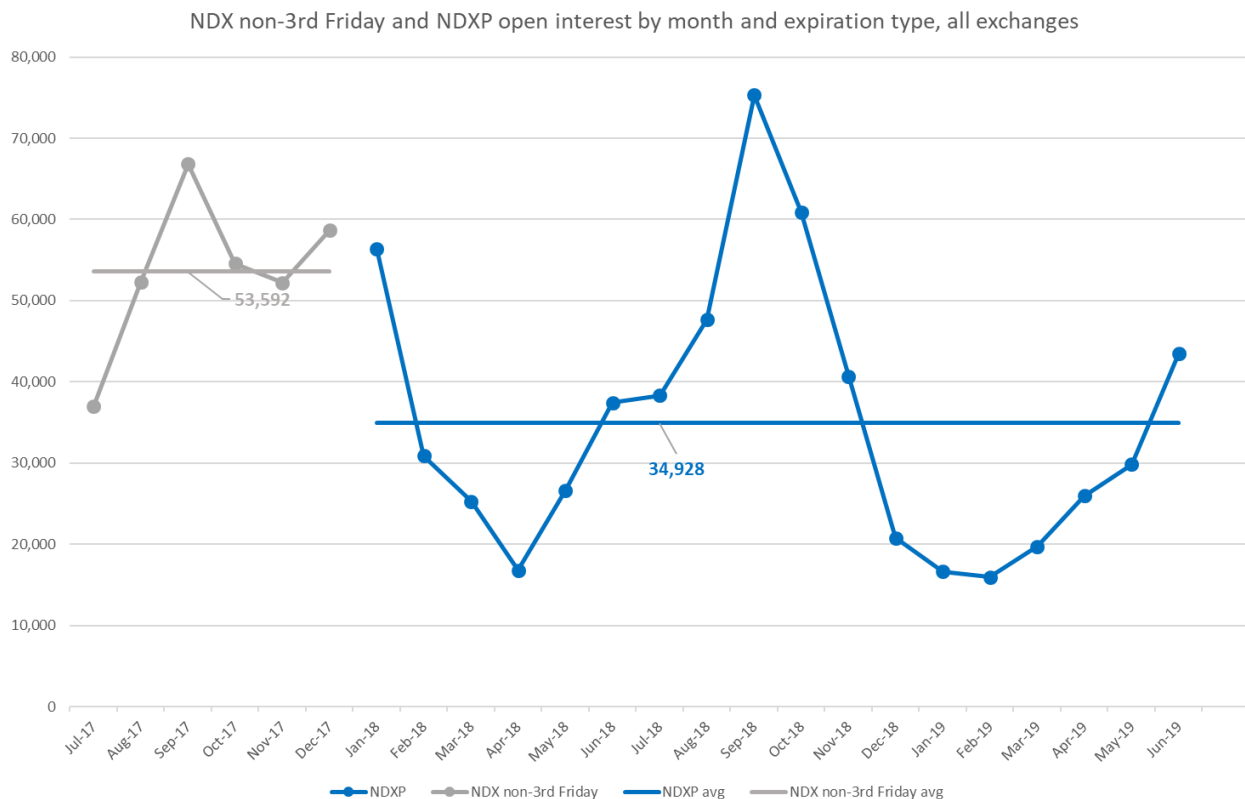
Ratio of NDXP open interest to class open interest				
Month	NDX	NDXP	Sum	Ratio
7/31/2017	115,491		115,491	0.00
8/31/2017	148,145		148,145	0.00
9/29/2017	140,978		140,978	0.00
10/31/2017	142,374		142,374	0.00
11/30/2017	175,566		175,566	0.00
12/29/2017	106,946		106,946	0.00
1/31/2018	68,543	56,330	124,873	0.45
2/28/2018	73,287	30,879	104,166	0.30
3/29/2018	69,796	25,276	95,072	0.27
4/30/2018	76,090	16,791	92,881	0.18
5/31/2018	82,429	26,626	109,055	0.24
6/29/2018	113,834	37,446	151,280	0.25
7/31/2018	93,721	38,338	132,059	0.29
8/31/2018	106,741	47,646	154,387	0.31
9/28/2018	94,781	75,324	170,105	0.44
10/31/2018	107,545	60,906	168,451	0.36
11/30/2018	134,295	40,710	175,005	0.23
12/31/2018	75,729	20,790	96,519	0.22
1/31/2019	80,582	16,667	97,249	0.17
2/28/2019	88,482	15,940	104,422	0.15
3/29/2019	69,836	19,716	89,552	0.22
4/30/2019	77,819	25,986	103,805	0.25
5/31/2019	99,495	29,858	129,353	0.23
6/28/2019	78,865	43,479	122,344	0.36

Monthly Analysis of Weekly Expiration and EOM Trading Patterns

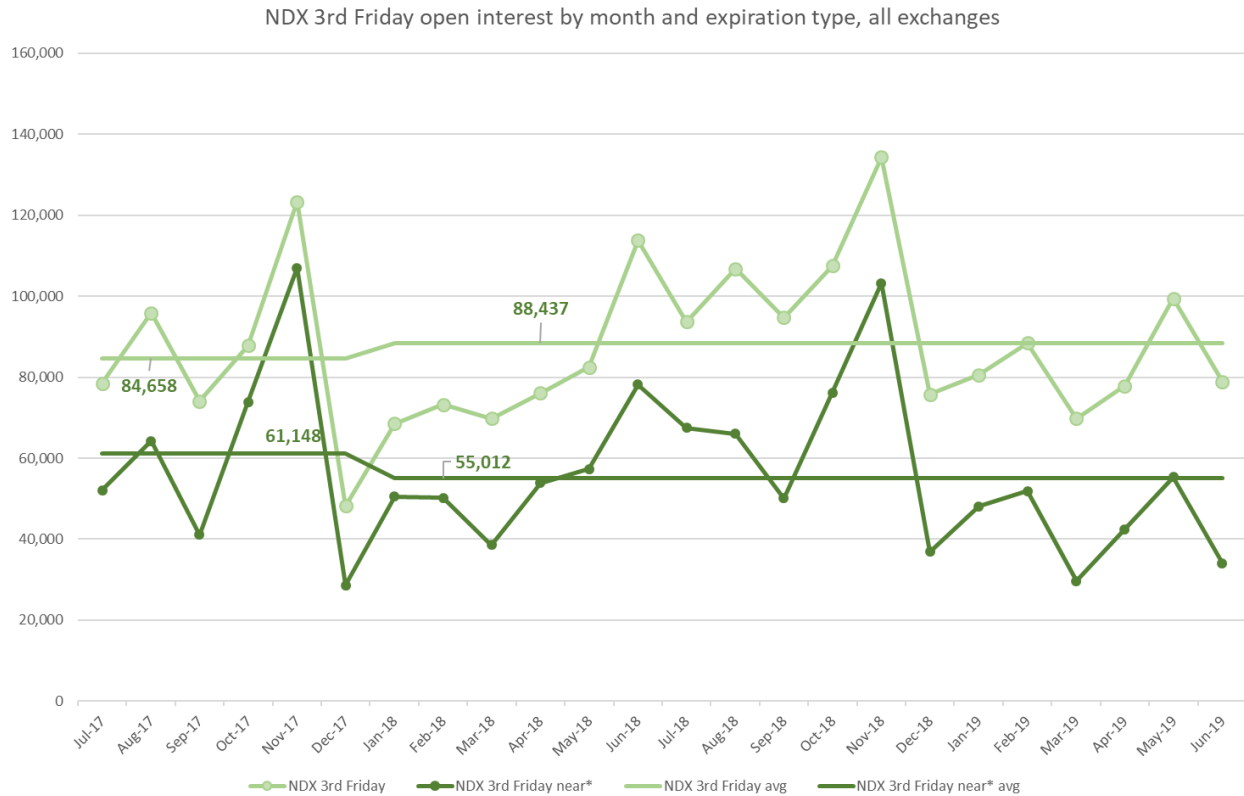
In this annual report, the Exchange analyzed open interest in Weekly Expiration series aggregated by expiration date compared to open interest in near-term standard Expiration Friday a.m.-settled series in order to determine whether users are shifting positions from standard series to Weekly Expiration series. PHLX has no data on other weekly p.m. settled products from other exchanges to compare open interest with these options in order to determine whether users are shifting positions from other weekly or monthly p.m.-settled products to the Weekly Expiration series. Declining open interest in standard series or the weekly p.m.-settled products of other exchanges accompanied by rising open interest in Weekly Expiration series would suggest that users are shifting positions.

Open interest trends:

After the introduction of NDXP and discontinuation of non-3rd Friday NDX contracts, open interest shifted from NDX regular Friday expirations to NDXP. Average month-end open interest fell from 53,592 contracts in NDX during Jul-Dec 2017 to 34,928 contracts in NDXP during Jan 2018 -Jun 2019. NDXP end of month average open interest has widely fluctuated between 16,667 and 75,324 contracts.



Open interest in the full range of 3rd Friday NDX contracts has not changed since the introduction of NDXP. Average open interest before the introduction was 84,658 contracts. Open interest after the introduction has been 88,437. Open interest in near-term 3rd Friday NDX contracts (expiring within 7 weeks) fell slightly after the introduction of NDXP. Month-end open interest in 3rd Friday NDX fell from 61,148 to 55,012 contracts, a 10% decline.



Clearly users shifted positions from discontinued NDX non-3rd Friday expiration contracts to NDXP. Any shift from 3rd Friday NDX contracts to NDXP is limited at most. First, NDXP does not compete directly with 3rd Friday expirations. Second, NDX 3rd Friday open interest has changed very little since the introduction of NDXP. Third, NDXP average open interest has so far been below the average open interest in NDX non-3rd Friday expiration contracts.

NDX and NDXP open interest at end of month, by expiration type, all exchanges

Month	NDXP	NDX 3rd Friday	NDX 3rd Friday near*	NDX non-3rd Friday	NDX Total
7/31/2017		78,484	52,094	37,007	115,491
8/31/2017		95,889	64,216	52,256	148,145
9/29/2017		74,150	41,045	66,828	140,978
10/31/2017		87,815	73,898	54,559	142,374
11/30/2017		123,347	107,011	52,219	175,566
12/29/2017		48,265	28,625	58,681	106,946
1/31/2018	56,330	68,543	50,560		68,543
2/28/2018	30,879	73,287	50,242		73,287
3/29/2018	25,276	69,796	38,598		69,796
4/30/2018	16,791	76,090	53,928		76,090
5/31/2018	26,626	82,429	57,337		82,429
6/29/2018	37,446	113,834	78,187		113,834
7/31/2018	38,338	93,721	67,461		93,721
8/31/2018	47,646	106,741	66,004		106,741
9/28/2018	75,324	94,781	50,078		94,781
10/31/2018	60,906	107,545	76,174		107,545
11/30/2018	40,710	134,295	103,171		134,295
12/31/2018	20,790	75,729	36,858		75,729
1/31/2019	16,667	80,582	48,117		80,582
2/28/2019	15,940	88,482	51,930		88,482
3/29/2019	19,716	69,836	29,712		69,836
4/30/2019	25,986	77,819	42,459		77,819
5/31/2019	29,858	99,495	55,364		99,495
6/28/2019	43,479	78,865	34,038		78,865

*NDX contracts with expirations within 7 weeks