

A SNAPSHOT OF BIOPHARMA: EVOLVING EQUITY CAPITAL MARKET DYNAMICS AND M&A LANDSCAPE

JUNE 1, 2023



Confidential

I.

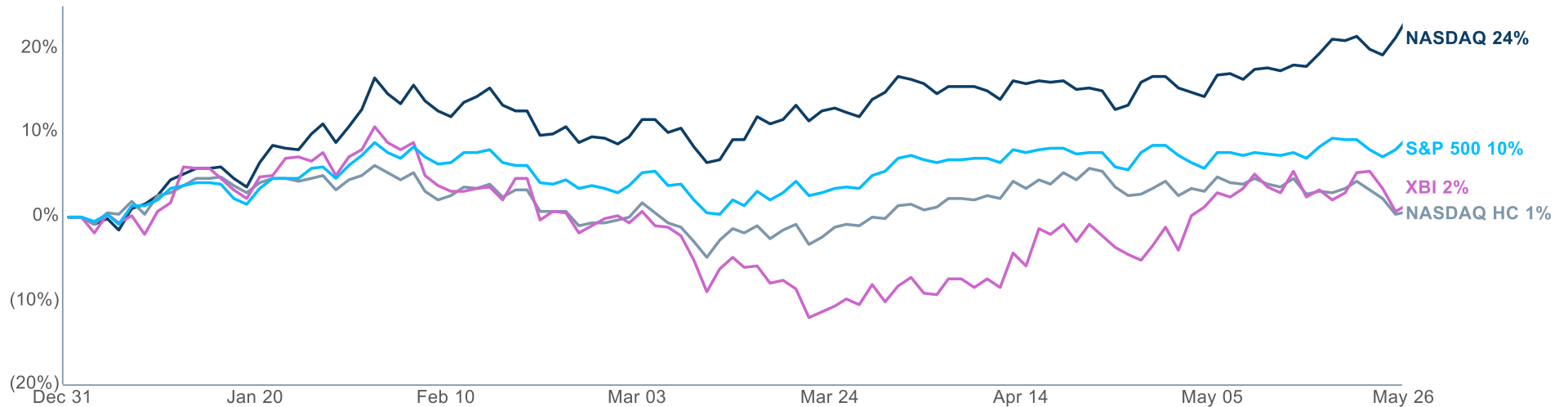
CAPITAL MARKETS ENVIRONMENT

EQUITY CAPITAL MARKETS OUTLOOK

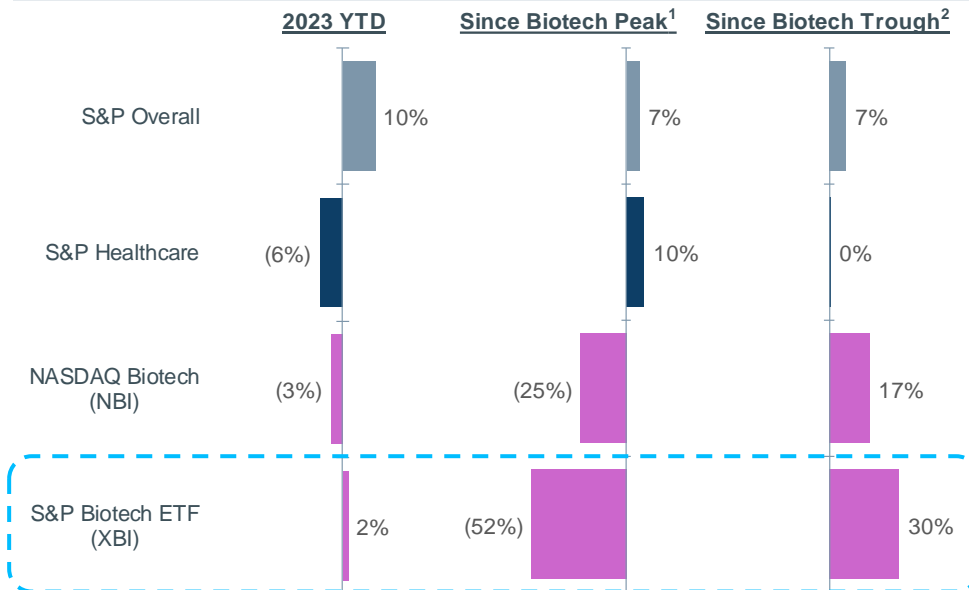
- The XBI has rebounded and is now positive year-to-date with the XBI up ~10% in Q2 versus the NASDAQ and S&P 500 up 4% and 1%, respectively. The rally has been driven by a combination of macro and sector-specific factors:
 - The latest CPI print showed the 10th straight month of annualized declines in inflation.
 - For the first time in over a year, the market is not expecting a rate hike at the next Fed meeting on June 14th.
 - There have been nearly \$73B in M&A deals announced year-to-date including ~\$22B in Q2.
 - Clinical and regulatory updates have skewed positive, highlighted by ImmunoGen's Phase 3 ovarian cancer update which resulted in a 1-day change of +136% and added \$1.6B to Company's market cap and Sarepta's AdComm for its DMD gene therapy which resulted in a 1-day change of +31% and added \$3.4B to Company's market cap.
- To sustain this rally, we'll need generalist investors to re-engage with the sector, which could follow further macro de-risking and continued sector-specific wins.
- Capital markets activity has remained strong. Q3 and Q4 2022 were the most active quarters for biotech follow-on activity since Q1 of 2021 with ~\$14B across 87 transactions raised in 2H 2022.
- Q1 2023 volumes exceeded Q1 2022 by ~\$2B, and Q2 2023 follow-on issuance is on pace to exceed the Q2 2022 total.
 - Specialist investors are actively deploying capital into new issues, while mutual fund participation continues to be selective.
 - Data-driven financings have been particularly well received and have attracted broad participation.
 - There continues to be strong interest from investors to sign CDAs, review data in a confidential setting and participate in financings concurrently with the public release of the data.
- The IPO market remains highly selective with only three deals year-to-date. Most recently, ACELYRIN priced a \$621M IPO and traded well out of the gate, one of the largest biotech IPOs ever.

THE XBI HAS REBOUNDED AND IS NOW AT THREE-MONTH HIGHS

EQUITY MARKET PERFORMANCE 2023 YTD

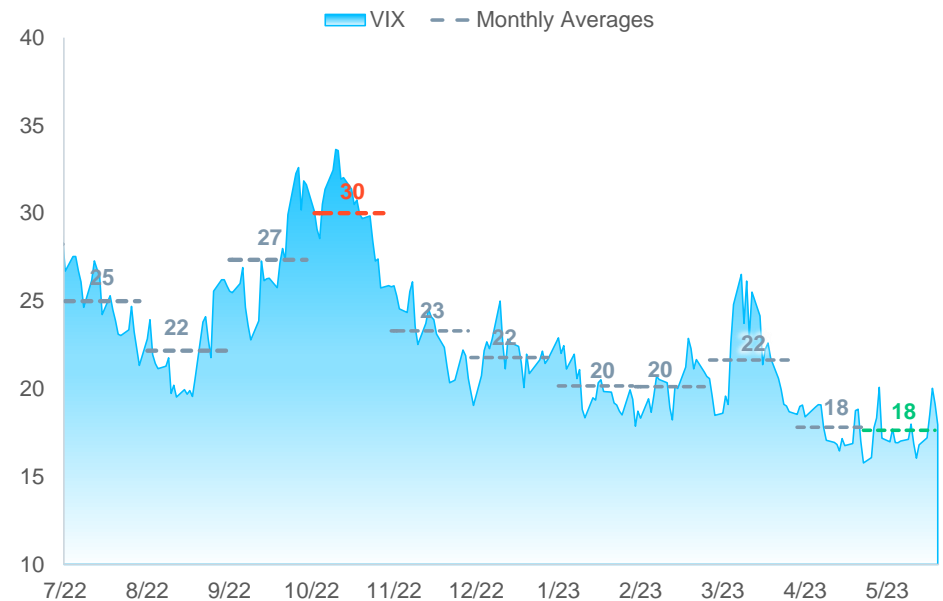


S&P 500 PERFORMANCE BY SECTOR



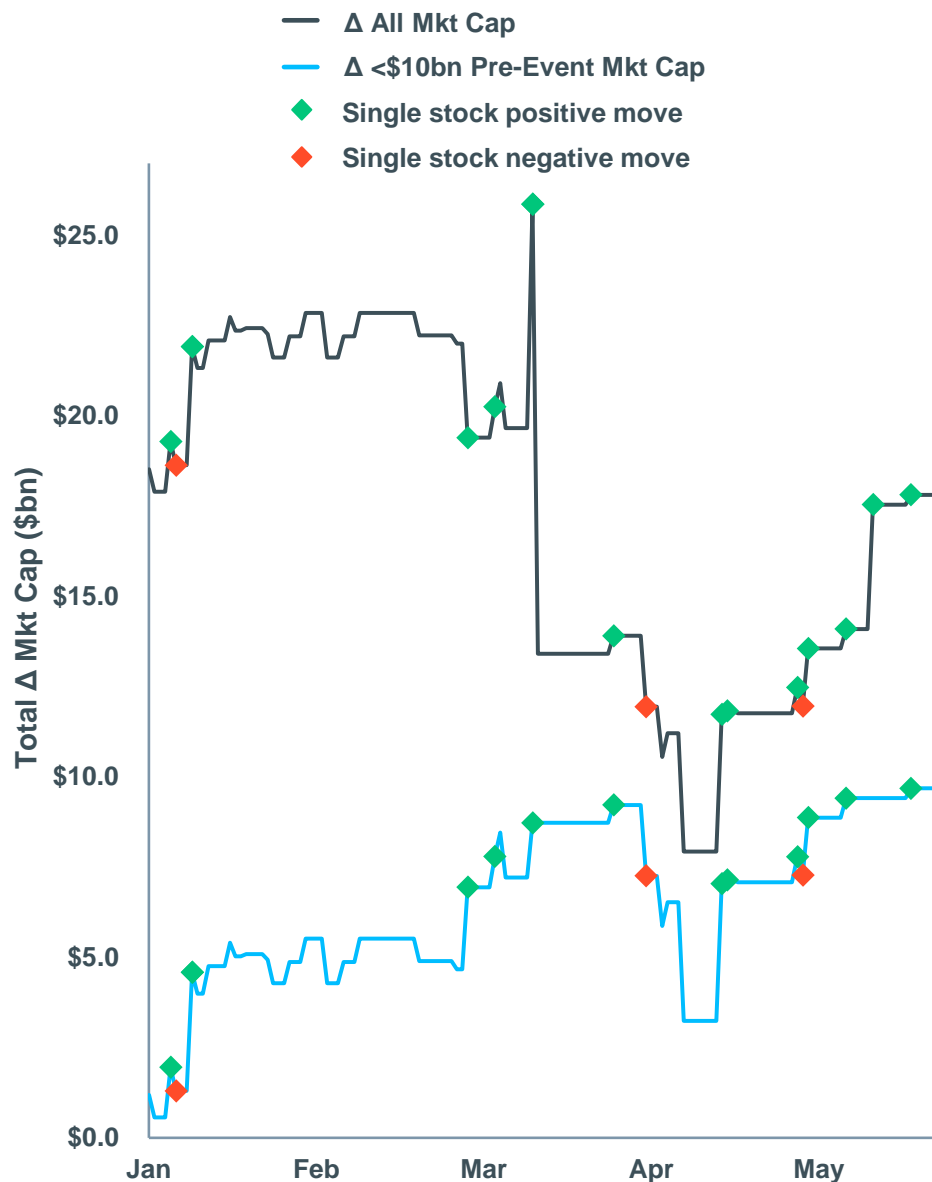
(1): Data since 02/08/21.
 (2): Data since 05/12/22.
 Note: Data as of 05/26/23.
 Source: FactSet, EPFR.

CBOE VOLATILITY INDEX (VIX)



MAJOR VALUE CREATION EVENTS HAVE BEEN MOSTLY POSITIVE YEAR-TO-DATE

ROLLING 3-MONTH CHANGE IN MARKET VALUE 2023 YTD



IN THE LAST 3 MONTHS, 12 OF THE 15 MAJOR EVENTS IN THE BIOPHARMA SPACE WERE VALUE CREATING

Date	Company	1 day % Change	Δ Mkt Cap (\$bn)	Event
05/22/23	Vectivbio	36%	\$0.3	Sale to Ironwood
05/15/23	Sarepta	31%	\$3.4	Recommendation to grant accelerated approval (DMD)
05/10/23	CTI	85%	\$0.5	Sale to SOBI
05/03/23	Immunogen	136%	\$1.6	Phase 3 data (PROC)
05/02/23	Traverse	(31%)	(\$0.5)	Phase 3 data (FSGS)
05/01/23	Iveric Bio	16%	\$0.7	Sale to Astellas
04/18/23	Bellus Health	98%	\$0.9	Sale to GSK
04/18/23	Relay	(36%)	(\$0.8)	Phase 1 data (Metastatic Breast Cancer)
04/17/23	Prometheus Bio	70%	\$3.8	Sale to Merck
04/03/23	Ascendis	(32%)	(\$2.0)	NDA deficiencies (Hypoparathyroidism)
03/28/23	Viking	69%	\$0.5	Phase 1 data (Diabetes / Obesity)
03/13/23	Seagen	15%	\$4.7	Sale to Pfizer
03/13/23	Provention Bio	260%	\$1.5	Sale to Sanofi
03/06/23	Bridgebio	52%	\$0.9	Phase 2 data (Achondroplasia)
03/01/23	Reata Pharma	199%	\$2.3	FDA Approval (FA)
TOTAL			\$17.8	

Note: Includes all M&A events, clinical and regulatory updates that generated 1-day stock price moves of 30%+ and market cap changes of \$500M+, and clinical and regulatory updates that generated 1-day stock price moves of 15%+ and market cap changes of \$3B+.

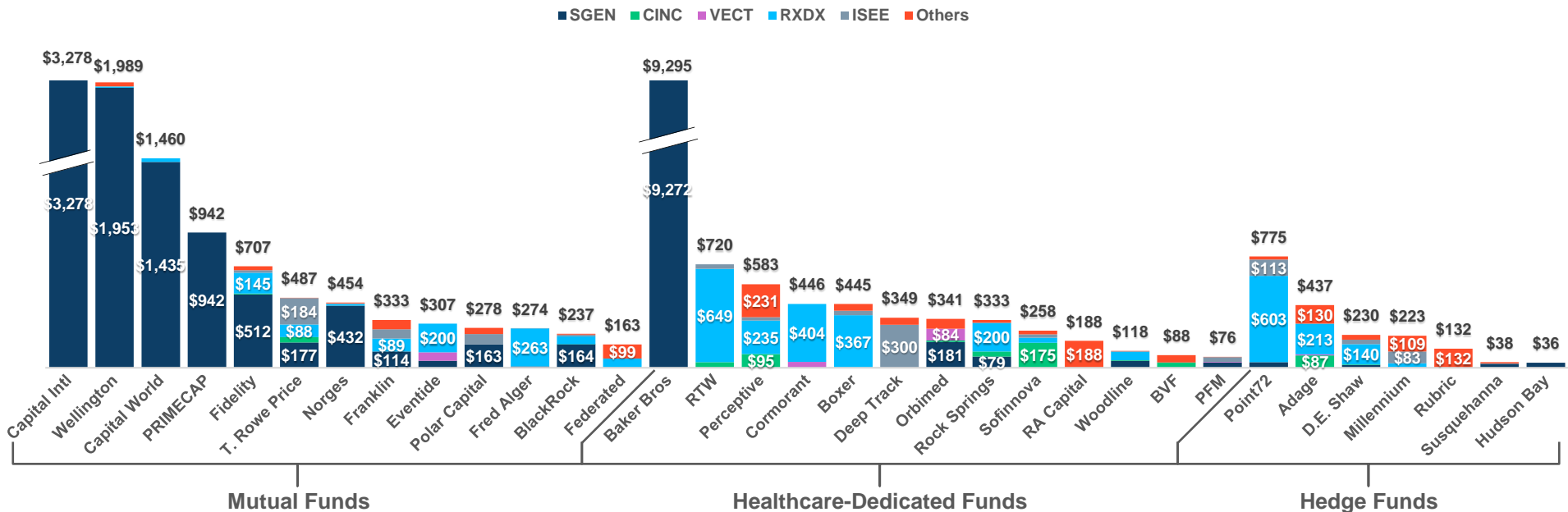
Source: Bloomberg, press releases.

M&A RELATED RETURN OF CASH TO INVESTORS OUTPACED NEW EQUITY ISSUANCE YEAR-TO-DATE

With an estimated \$1.4 trillion of capital available for acquisitions, up 11% from last year, and an expected 24% decline in global sales by 2030 due to loss of patent exclusivity, Large Pharma is focused on M&A in 2023

Announced Areas of Interest			Key Drugs Facing Generic Competition or Nearing Patent Expiry		Large Pharma Commentary
Disease Area	Technologies	Phase of Dev			
<ul style="list-style-type: none"> Oncology Heart Immune Neuro Rare 	<ul style="list-style-type: none"> Cell therapy Gene therapy RNA therapy 	<ul style="list-style-type: none"> Early-to-mid stage clinical 	<ul style="list-style-type: none"> ABBV: Humira AMGN: Prolia and Xgeva BMJ: Revlimid JNJ: Stelara 	<ul style="list-style-type: none"> NVO: Victoza NVS: Entresto MRK: Keytruda, Januvia REGN: Eyelea 	<ul style="list-style-type: none"> ABBV: Lifting self-imposed \$2B limit on M&A deals BIIB: ~\$10B available for BD deals MRK: Will be active in dealmaking in 2023 NVS: Focused on early-to-mid stage assets valued at \$5B or lower PFE: Goal of adding \$25B in revenue by 2030 from BD

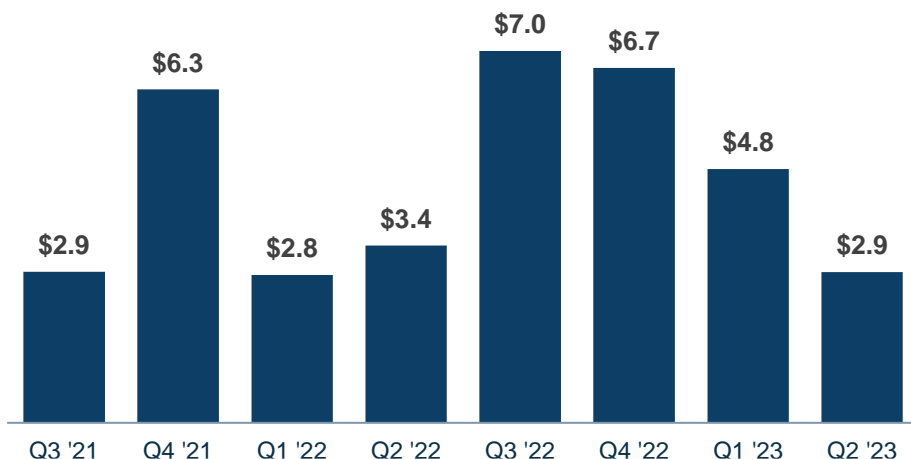
\$73 billion of capital returned to investors through public M&A since January 1st, 2023, compared to just \$8 billion of new equity issuances



Note: Based on latest available holdings and position size on day of acquisition announcement. \$ in millions.
 "Others" bucket includes acquisitions of Provention, CTI, BELLUS, Concert, Amryt, Albiro.
 Source: FactSet, Wall Street Journal.

YEAR-TO-DATE ISSUANCE HAS OUTPACED ACTIVITY FROM THE SAME TIME PERIOD IN 2022

QUARTERLY BIOPHARMA FOLLOW-ON ISSUANCE (\$B)



#	22	35	13	31	43	44	30	21
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ANNUAL BIOPHARMA FOLLOW-ON ISSUANCE (\$B)



#	90	141	190	144	231	196	131	51
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(1): CMPOs, UCMOs, PIPEs, and RDOs assume 2 days of confidential marketing.

Note: "CMPO" stands for "confidentially-marketed public offering". "UCMO" stands for "underwritten confidentially marketed offering". "RDO" stands for "registered direct offering". FO includes marketed offerings, CMPOs, UCMOs, RDOs, PIPEs. Excludes de-SPAC PIPEs and strategic financings.

Source: Dealogic. Includes offerings between \$30 million and \$1 billion in base deal size. Mean and median exclude deals with warrant coverage.

LAST 20 BIOPHARMA FOLLOW-ONS / PIPEs

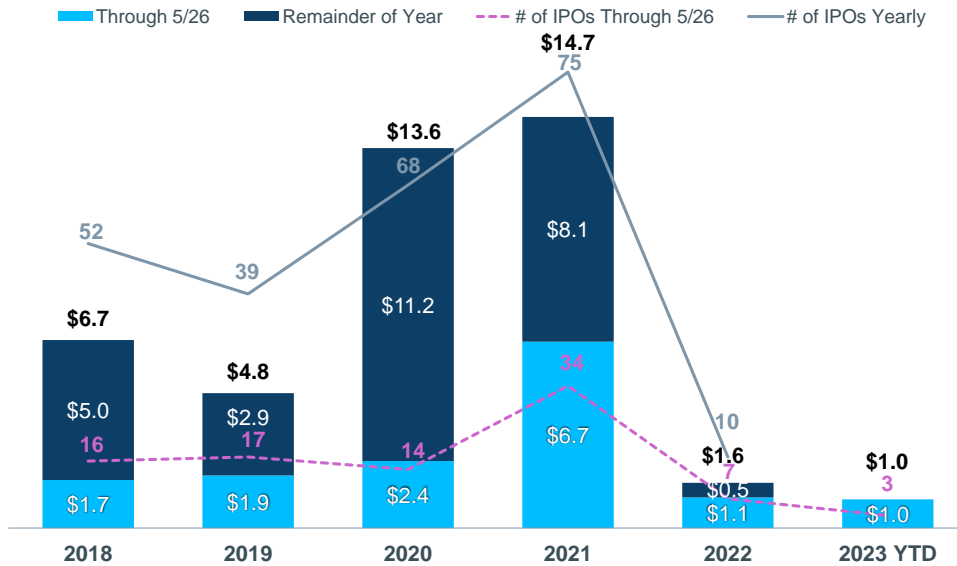
(\$ in millions)

Date	Issuer	Deal Size	Pre-Deal Market Value	File to Offer ¹	Stock Price Offer / 1 Day	Current	Marketing Format
May 26	TScan Tx	\$140	\$47	(22%)	60%	60%	CMPO
May 26	Lyra Tx	50	77	(7%)	4%	4%	PIPE
May 23	Phantom Pharma	131	570	(11%)	(0%)	0%	CMPO
May 18	Prelude Tx	100	302	(13%)	(3%)	(4%)	CMPO
May 17	Cabaletta Bio	87	468	5%	3%	(25%)	CMPO
May 16	X4 Pharma	65	184	2%	16%	32%	PIPE
May 16	Coheris Bio	57	394	(18%)	22%	2%	CMPO
May 16	Akero Tx	220	2,324	(9%)	10%	7%	UCMO
May 15	Ikena Onco	40	254	(10%)	7%	(9%)	UCMO
May 12	Ani Pharma	86	789	(11%)	5%	17%	CMPO
May 4	ImmunoGen	374	3,002	2%	5%	12%	Marketed
May 4	4D Molecular	138	534	(15%)	6%	10%	CMPO
May 3	Morphic	276	1,925	(5%)	14%	27%	CMPO
May 3	Reneo Pharma	63	248	(21%)	22%	2%	CMPO
May 1	Eledon	35	29	3%	(0%)	(20%)	PIPE
Apr 25	IDEAYA	201	980	27%	1%	20%	CMPO
Apr 24	Applied Tx	30	46	(2%)	16%	37%	PIPE
Apr 19	Vaxcyte	575	4,037	(3%)	12%	19%	Marketed
Apr 18	Immuneering	30	323	(11%)	21%	(41%)	UCMO
Apr 11	InfraRx	46	223	(23%)	(4%)	(2%)	CMPO
Mean		\$137	\$838	(8%)	11%	7%	
Median		87	358	(11%)	6%	5%	

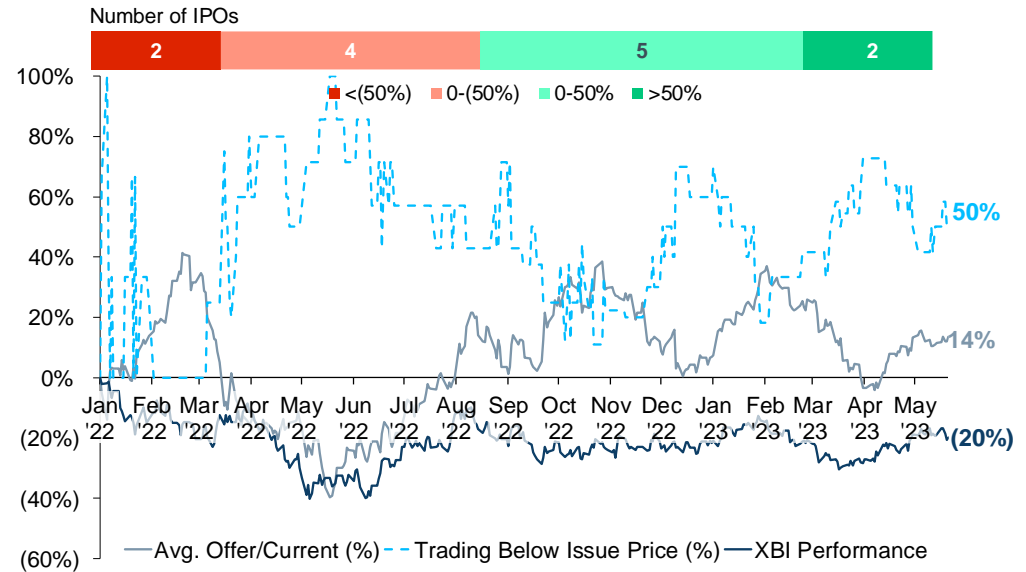
WARRANT COVERAGE

BIOPHARMA IPO MARKET SNAPSHOT

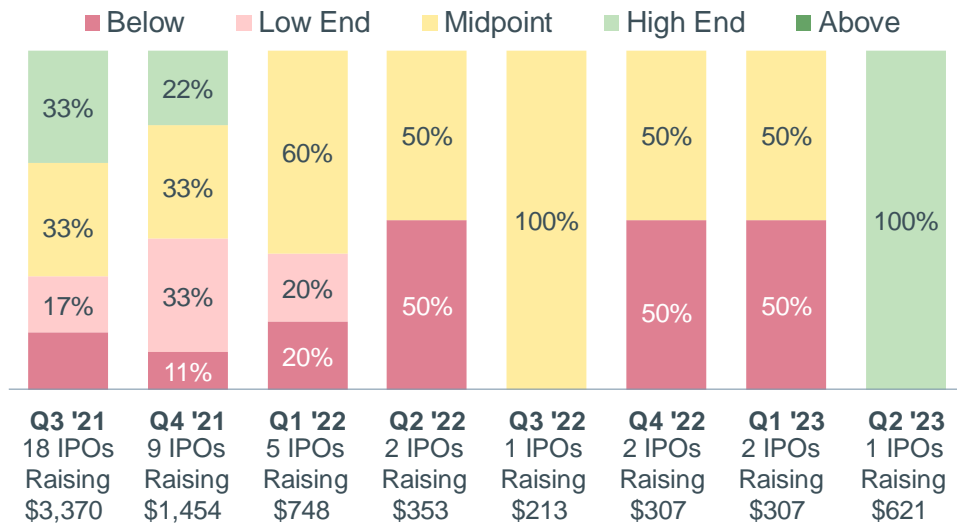
BIOPHARMA IPO ISSUANCE (\$B)



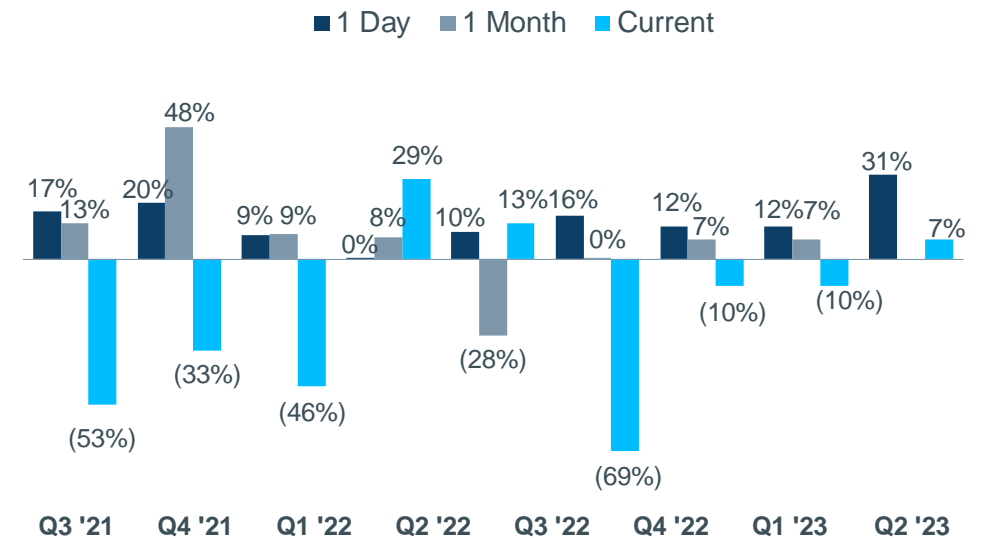
PERFORMANCE OVER TIME – SINCE 2022¹



PRICING VS. RANGE

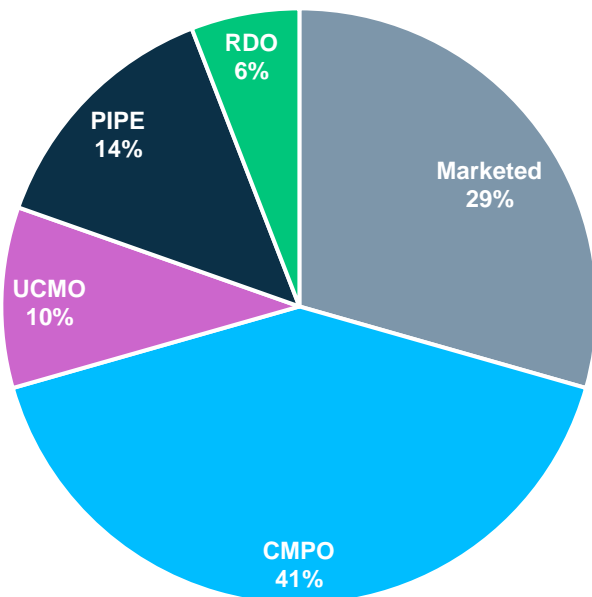


AFTERMARKET PERFORMANCE



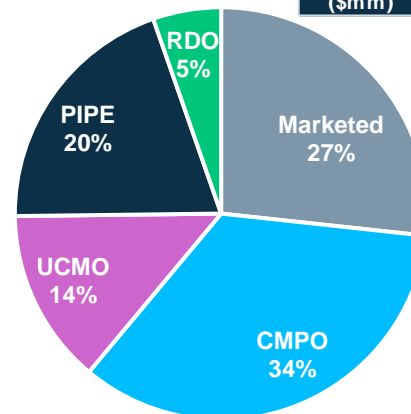
“NON-TRADITIONAL” OFFERING FORMATS REMAIN PREVALENT IN 2023

2023 YTD BREAKDOWN BY DEAL TYPE



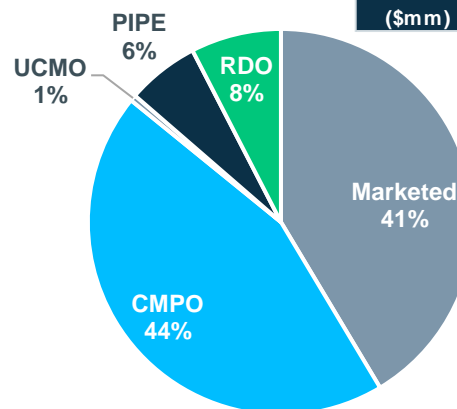
	Marketed	CMPO	UCMO	PIPE	RDO
Total #	15	21	5	7	3
Total (\$mm)	\$4,303	\$2,523	\$383	\$328	\$136

2022 BREAKDOWN BY DEAL TYPE



	Marketed	CMPO	UCMO	PIPE	RDO
Total #	35	45	18	26	7
Total (\$mm)	\$9,230	\$5,526	\$1,842	\$2,653	\$661

2021 BREAKDOWN BY DEAL TYPE



	Marketed	CMPO	UCMO	PIPE	RDO
Total #	82	88	1	12	15
Total (\$mm)	\$17,358	\$7,508	\$75	\$954	\$1,002

- “Non-traditional” offering formats have become a popular option for issuers in 2022 including a proliferation of PIPEs, underwritten confidentially marketed offerings, and registered directs
- In a challenging market backdrop, structured financings have helped to incentivize investor participation: 14% of transactions YTD have included warrants vs. 14% in '22 and 6% in '21

II.

M&A LANDSCAPE

WITH >\$400B CAPACITY AND >2025E LOE, LARGE BIOPHARMA COMPANIES ARE LIKELY TO REMAIN KEYED TOWARDS COMMERCIAL OR LATE-STAGE OPPORTUNITIES

KEY BIOPHARMA M&A THEMES IN 2022

- Significant interest in commercial stage or fully clinically de-risked assets
- Opportunistic international and SMID cap players took advantage of the extreme dislocation in the biotech market
- Large cap pharma companies remained focused on M&A within core strategic areas and were willing to pay large premia to access the right strategic assets.
- Single product commercial biopharma companies attracted private equity buyers
- Companies with substantial cash balance but low to negative enterprise values and single product commercial biopharma companies attracted activist investor interest
- Illiquid IPO market and depressed public biotech stock prices led to a heightened interest in reverse mergers, mergers of equals and liquidations of distressed biotech companies

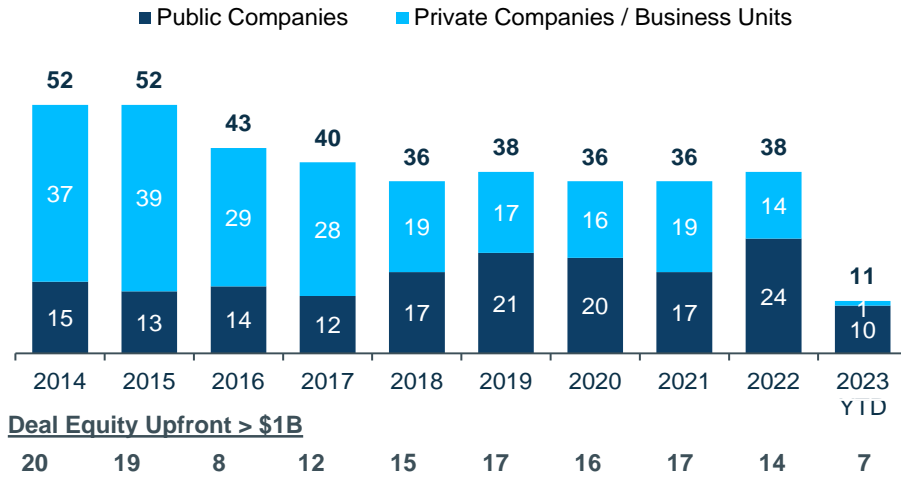


KEY M&A THEMES TO WATCH IN 2023

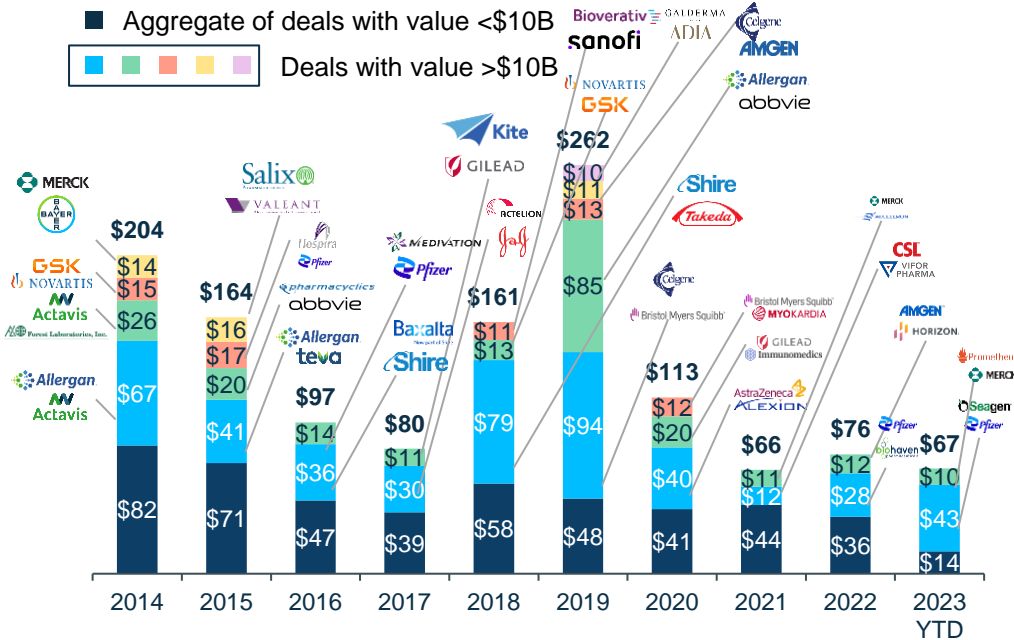
- Large biopharma companies still have >\$400 billion to deploy
- Expect continued focus on late-stage clinical and commercial assets to help address pending LOE issues beginning in 2025
- Perceived FTC risk will continue to negatively impact mega-merger activity, leading to more SMID cap biotech M&A
- Expect continued CFIUS scrutiny of transactions involving Chinese biopharma, exemplified by challenges that faced Sino Biopharma's acquisition of F-Star
- Partnerships preferred for earlier stage platforms and clinical programs; however, if public company biotech valuations remain depressed despite clinical progress, M&A interest may shift to earlier-stage, novel/differentiated assets with promising early data
- Several private biotech companies that were able to raise significant cross-over funding in 2020-2021 have not been able to go public despite making significant progress on their programs, which may lead to more private biotech M&A deals going forward if the public capital markets continue to remain challenged
- Boards of companies with substantial cash balances but negative enterprise values will push management teams to more actively explore strategic alternatives including reverse mergers, mergers of equals and liquidations
- CVRs will continue to be a key mechanism to bridge value gaps, especially acquisitions of commercial stage companies and assets

2023 YTD – FIVE BIOPHARMA M&A DEALS WITH TRANSACTION ENTERPRISE VALUE > \$1BN

NUMBER OF TRANSACTIONS (UPFRONT EQUITY VALUE >\$100M)



AGGREGATE DEAL VALUE (UPFRONT EQUITY VALUE >\$100M)



'21-'23 YTD BIOPHARMA TRANSACTIONS (ENTERPRISE VALUE >\$1B)

Announce Date	Target	Acquirer	Transaction (Enterprise) Value	1-Day Unaffected Premium
05/22/23	VectivBio	Ironwood	1.0	4%
05/10/23	CTI BioPharma Corp.	Swedish Orphan Biovitrum AB	1.4	89%
04/30/23	Iveric Bio	Astellas	5.4	75% ⁽¹⁾
04/18/23	Bellus Health	GSK	1.6	103%
04/16/23	Prometheus Biosciences, Inc.	Merck	10.2	75%
03/13/23	Provention Bio	Sanofi	2.5	273%
03/13/23	Seagen	Pfizer	42.7	33%
01/08/23	Amryt Pharma	Chiesi Pharma	1.2	107%
12/13/22	Nimbus, Lakshmi subsidiary	Takeda	4.0	
12/12/22	Horizon Therapeutics	Amgen	28.0	48%
11/21/22	Imago Biosciences	Merck	1.2	107%
10/23/22	Myovant Sciences	Sumitovant Biopharma	2.9	10%
08/08/22	Global Blood Therapeutics	Pfizer	5.0	102% ⁽¹⁾
08/04/22	ChemoCentryx	Amgen	3.6	116%
06/03/22	Turning Point Therapeutics	Bristol-Myers Squibb	3.1	122%
05/31/22	Affinivax	GSK	2.1	
05/10/22	Biohaven Pharmaceutical	Pfizer	12.3	79%
04/13/22	Sierra Oncology	GSK	1.7	39%
03/28/22	Theramex, CVC Funds	Carlyle, PAI Partners	1.6	
01/19/22	Zogenix	UCB	1.4	66%
12/21/21	Amunix	Sanofi	1.0	
12/14/21	Vifor	CSL	11.6	8% ⁽¹⁾
12/13/21	Arena Pharmaceuticals	Pfizer	5.9	100%
11/18/21	Dicerna	Novo Nordisk	2.7	80% ⁽¹⁾
09/30/21	Acceleron	Merck	10.8	13%
09/17/21	Biotest	Grifols	1.3	
09/08/21	Kadmon Holdings	Sanofi	1.7	79%
08/23/21	Trillium Therapeutics	Pfizer	2.0	204%
08/05/21	Vividion Therapeutics	Bayer	1.5	
08/03/21	Translate Bio	Sanofi	2.6	30%
06/02/21	Constellation Pharmaceuticals, Morphosys AG		1.3	68%
03/04/21	Five Prime	Amgen	1.6	79%
02/25/21	Pandion	Merck	1.7	134%
02/03/21	GW Pharmaceuticals	Jazz Pharmaceuticals	6.5	50%

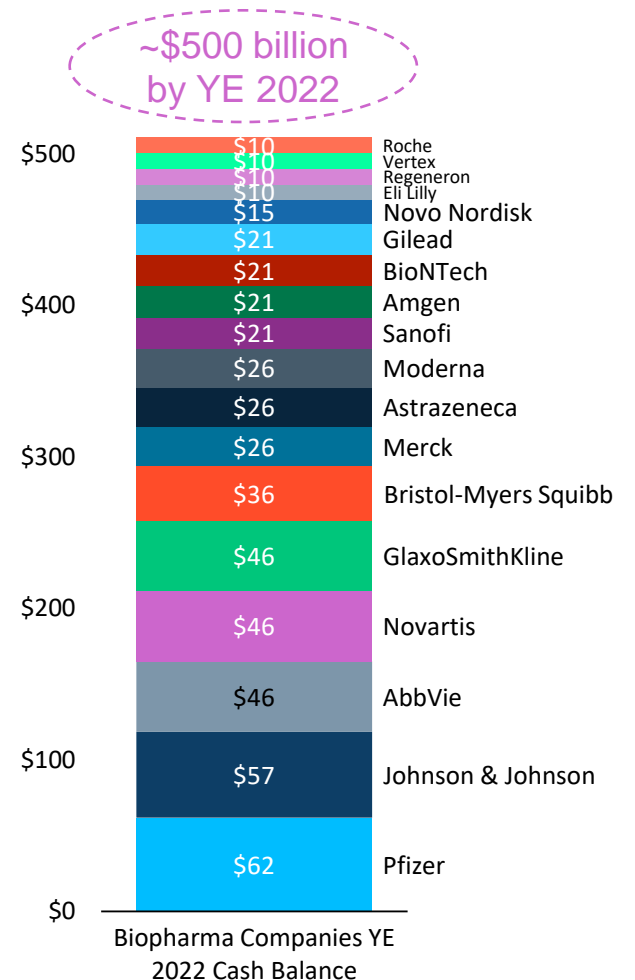
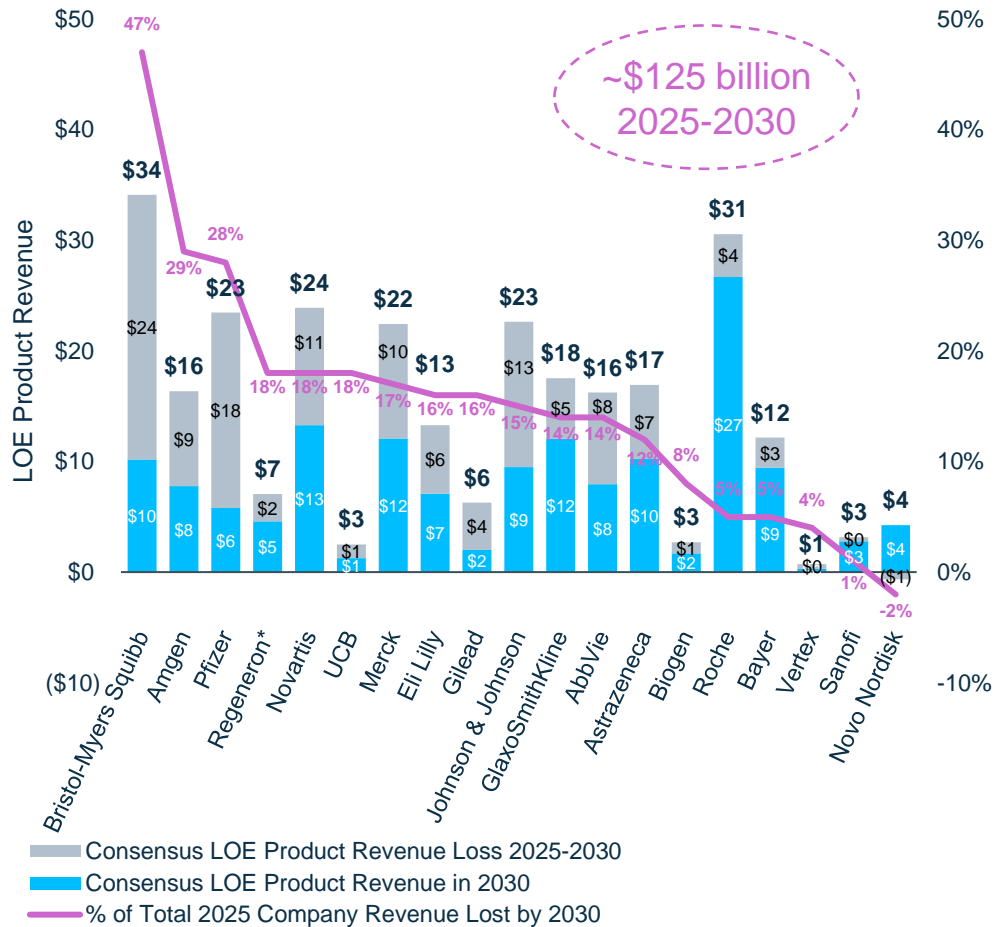
(1): Unaffected date refers to the day prior to buyout rumors.
 Note: Includes change-of-control and selected major unit or sub-unit deals in the United States, Canada and Western Europe with upfront enterprise values greater than \$100M.
 Source: Press releases and SEC filings. Data as of 04/18/23.

MAJOR BIOPHARMAS FACE SIGNIFICANT LOE REVENUE EROSION IN THE 2025+ PERIOD

LOE EROSION UNDERSCORES THE NECESSITY OF PORTFOLIO REPLENISHMENT; THERE IS AMPLE DRY POWDER TO SUPPORT NEEDED BD

LOE 2025E-30E; SORTED BY % OF 2025 REVENUE LOST BY 2030

YE 2022 CASH BALANCE ESTIMATES AT MAJOR BIOPHARMA COMPANIES; SORTED BY CASH BALANCE



Oncology, CV/Met and Immunology therapeutic areas are expected to be of main focus for replenishment and future M&A activity

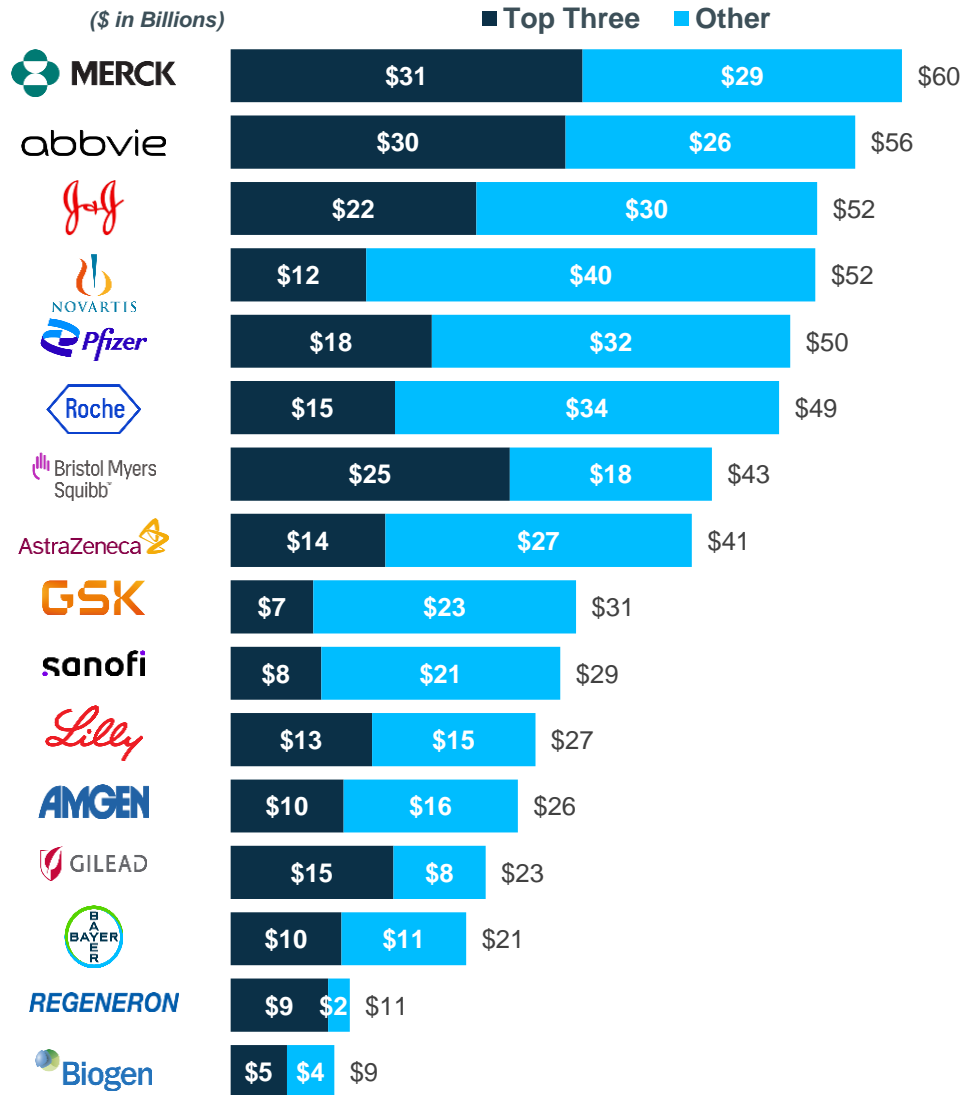
Note: Top of the gray bar represents total revenue for products facing LOE 2021-2029 in 2025. Blue bar represents remaining revenue of those products estimated to remain in 2030

Assuming a median acquisition price of 5x 2030 revenue, replacing ~\$125 billion in collective revenue will require ~\$600 billion in acquisitions over the next several years

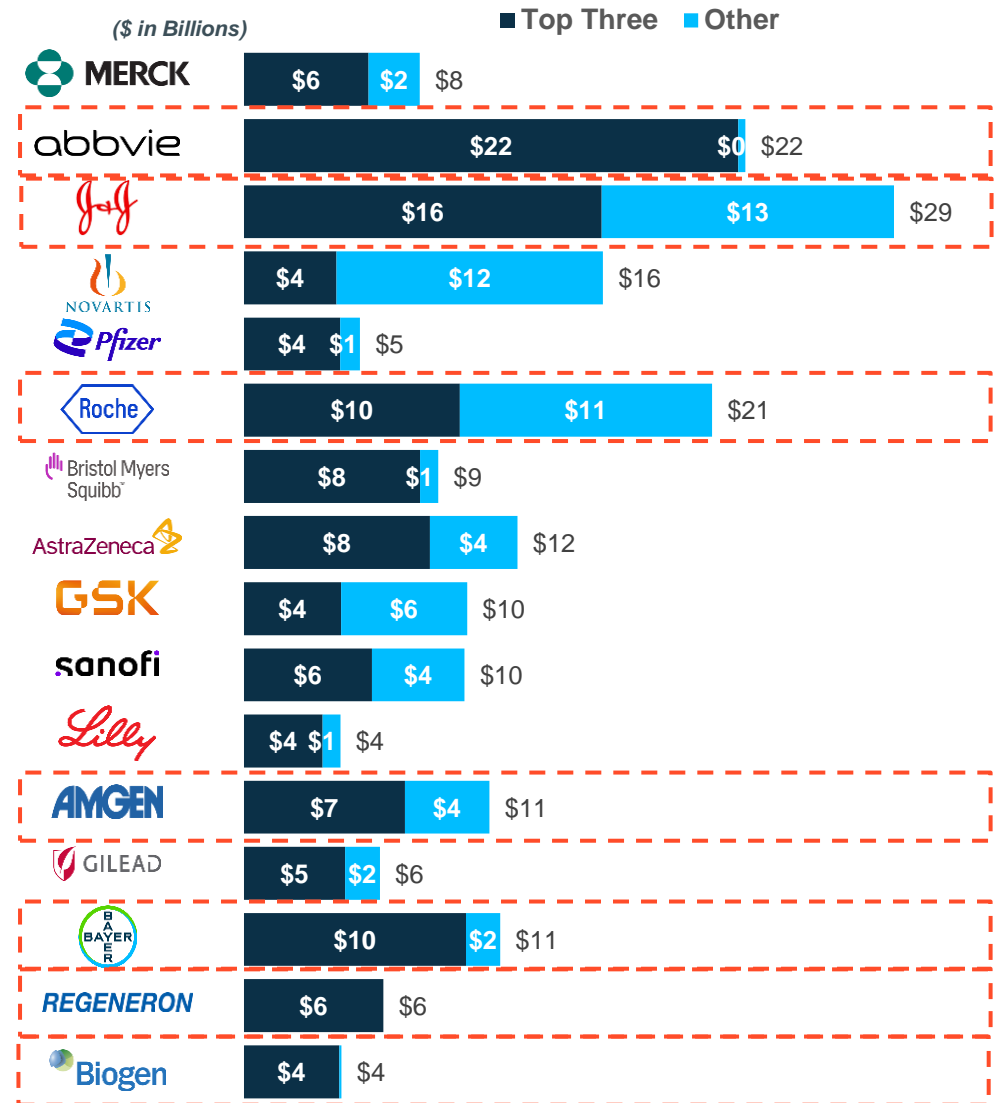
SEVEN LARGE PHARMA COMPANIES HAVE OVER 40% OF THEIR 2022 SALES AT RISK DUE TO LOE BY 2025

SORTED BY 2022 PHARMACEUTICAL SALES

2022 SALES CONCENTRATION



2022 SALES AT RISK DUE TO LOE BY 2025⁽¹⁾



(1): Includes drugs with patent expiration from 2020-2025.

Note: Includes worldwide pharmaceutical sales only. All figures are adjusted to include partnership and licensing revenue. All figures are adjusted to remove sales from COVID therapeutics or vaccines.

Source: Evaluate Pharma, company filings.

Denotes company with > 40% of 2022 revenue at risk due to LOE by 2025



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