Biopharmaceutical Sector Outlook for 2024

Jan 5, 2024

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Investor Mood Brightening

We have spoken to quite a few investors in recent weeks and can report that the negative sentiment of October has almost entirely disappeared.

Investors took some well-deserved time off to relax during the holiday season. The mood was definitely better, and it was nice to enjoy the champagne at New Years.

A turning market is typically marked by a mix of hope, relief, trepidation and optimism. That is where we stand today. Investors are hopeful for good results in 2024 and many are even optimistic.

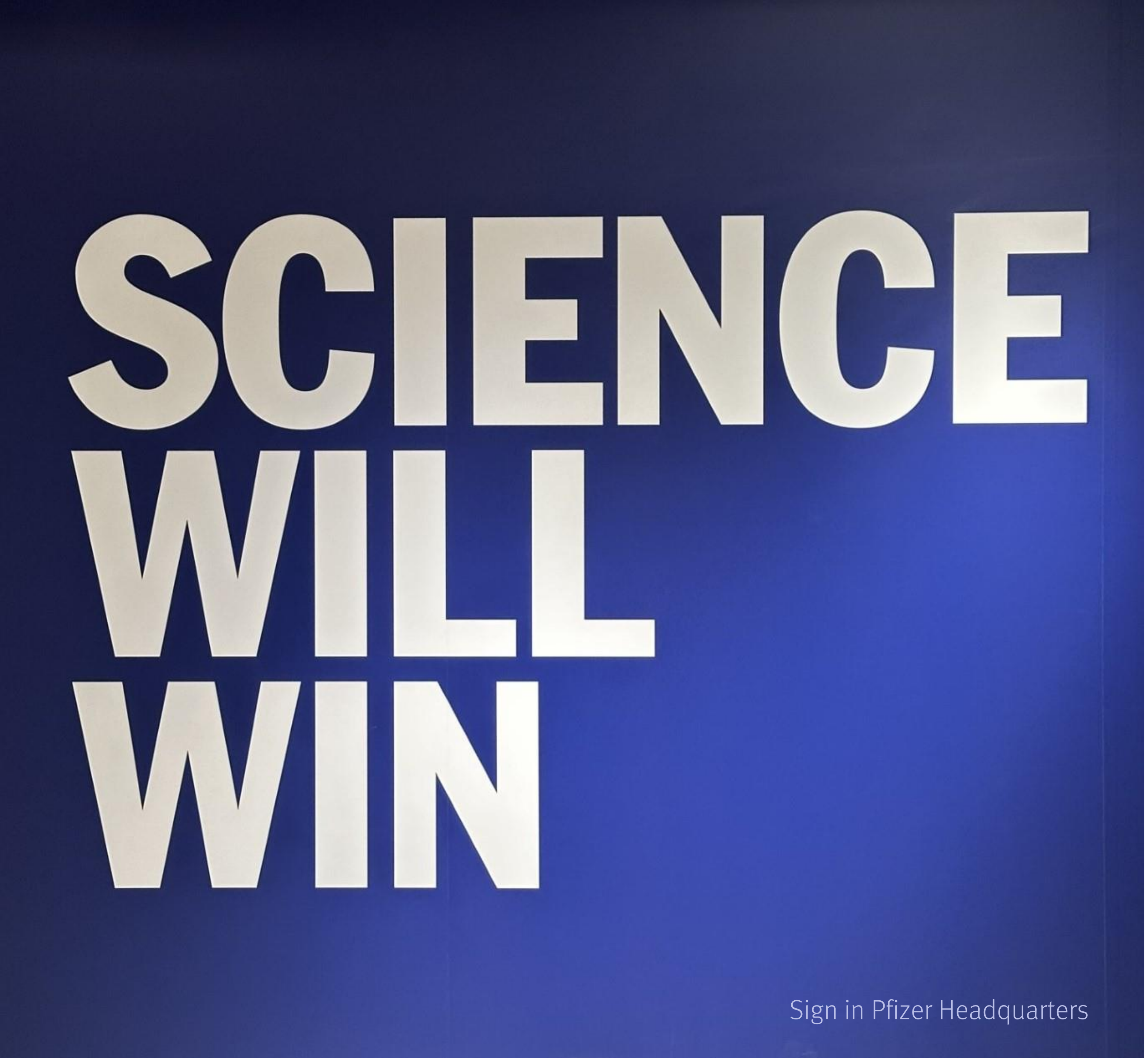
But no one could be described as excited or euphoric. That remains far away.

We do expect that a market recovery will take hold in 2024 and that it will not be easy going. Tentative at times. Bold at others.

There is still residual macro and geopolitical risk. It's an election year to boot and we have no doubt that some of the political mud slinging will land on the doorstep of the pharmaceutical industry.

But the underlying fundamentals are highly attractive. Valuations remain low by historic standards. The quality of biotech stories today is better than ever. The upside from the explosion of biosciences understanding, improved insights into disease biology and growing global demand for effective medicines is unmistakable.

We wish you a great 2024!



Sign in Pfizer Headquarters

Accessing Past Issues

If you are not on the mailing list for this publication and wish to be added, please notify Natasha Yeung (yeungn@stifel.com). Recent issues in case you missed and want to read:

Dec 18, 2023 (Expectations for 2024)
Dec 11, 2023 (ASH, R&D Days)
Dec 4, 2023 (Big Pharma, CEA)
November 22, 2023 (Bullish on Biotech)
November 20, 2023 (M&A)
November 13, 2023 (AHA, Bear Market)
November 7, 2023 (Unmet Needs)
October 30, 2023 (ADCs)
October 23, 2023 (ESMO Review)
October 16, 2023 (Cancer Screening)
October 9, 2023 (Biosimilars, M&A)
October 2, 2023 (FcRn, Antibiotics)
September 25, 2023 (Target ID)
September 18, 2023 (Changing Pharma Strategy)
September 11, 2023 (US Health System)
September 5, 2023 (FTC, IRA, Depression)
August 21, 2023 (Covid, China)
August 7, 2023 (Employment, Summer reading)
July 24, 2023 (Alzheimer's Disease)
July 7, 2023 (Biotech market review – H1 '23)
July 1, 2023 (Obesity drugs)
June 19, 2023 (Generative AI)
June 12, 2023 (IRA, State of Industry)
May 29, 2023 (Oncology update)
May 22, 2023 (FTC case on Amgen/Horizon)

Join Us at These Upcoming Events

Biotech Hangout will hold its next event on January 5, 2023.

We'd be thrilled to have you join.

To Learn More
https://www.biotechhangout.com/

The week of Jan 7, 2024 will feature over 30,000 biopharma professionals in SF for JPM, Biotech Showcase and many other events.

To meet with Stifel
yeungn@stifel.com

Trends, Themes and Predictions for 2024

Stifel's 2024 Predictions: Summary

Macro / Geopolitical

- Inflation ↓
- Rates ↓
- 2024 U.S. Election ?
- Treasury Borrowing & Debt ↑
- Geopolitical Tensions ↓ ?

Capital Markets and M&A

- XBI: up but volatile ↑
- Generalists and retail are back – but specialists rule
- IPOs ↑
- Privates ↑
- PIPEs ↑
- Follow-Ons ↑
- Mid/late stories do best – investors remain quality focused
- M&A level flat – need to get through election and potential FTC change

Market Themes

- Big drugs for big diseases bigger than before ↑
- Obesity ↑ ↑
- CV/HF/HTN ↑
- Fibrosis / NASH →
- Oncology →
- Immunology ↑
- Diabetes field differentiates & grows ↑
- AI ↑
- Neuro ↑ ↑
- Payor power & PBMS hurt pharma ↓
- Spec Pharma & Generics ↑
- Big Pharma Strategy in major flux
- China Innovation ↑

Our Views on the Macro and Political Outlook in 2024

1. Inflation continues to drop in 2024 and other macro negatives also continue to disappear even though the Fed takes it time.
2. Declining rates put some pressure on commercial banks but they manage through it.
3. Treasury gets back to what it loves to do - borrow lots of money. The U.S. Treasury Quarterly Refunding Announcement in Q4 was very friendly to market – most likely by design. That can't last as the deficit is just too big for light borrowing. U.S. borrowing will keep some upward pressure on long rates - we don't get back to sub-2% yields of 2019 for a long time. This will work to prevent an absolute explosion in the XBI.
4. US election gets a lot of attention, will be close and is likely to be quite nasty.
5. It feels like Trump's momentum won't get stopped by the many legal challenges as the Supreme Court won't let it happen.
6. The question will be how much the improving economy helps Biden.
7. Nikki Haley is emerging as key challenger to Trump. She has no record of using anti-pharma rhetoric in chasing votes and is a non-populist, fiscal conservative who appeals to many voters. If she does well in the primaries it could be a major positive for pharma.
8. The election doesn't change the biotech market's positive direction - historically, it hasn't.
9. IRA legal challenges continue to make progress in 2024 – which creates pressure to rewrite the law.
10. However, the IRA doesn't get fixed until after the election – and it's not a slam dunk that it happens even then.

Our Views on the Biopharma Capital Markets in 2024

1. Big funds flow into biopharma and biotech:
   a) Generalists come in and retail gets new interest – FOMO factor is real
   b) Outperformance of tech unlikely to persist relative to biopharma
   c) Many healthcare savvy investment groups continue to come out of cash and net short positions
2. The XBI goes over 100 again but doesn't get anywhere near 150 this year.
3. Investors stay focused on stock picking and funding the best life sciences stories. Preference for great science, mid/late stage biopharma and commercial growth opportunities. No generalist euphoria sweeps the market
4. Turbulence and volatility remain in market:
   a) Some hedge funds continue with drawdowns
   b) Electoral jawboning on pharma pricing
   c) Volatility / gamma managing quant funds continue to accentuate the wild swings we have been seeing
5. Lots, lots more M&A in 2024:
   a) But M&A volume not up from 2023 which was a record for biotech M&A.
   b) Prices go up - a lot
   c) Biotech consolidation / cleanup continues as smallco's that can't finance well continue to merge or disappear
6. Continued interest in hot areas like I&I (e.g., Gracell M&A in Dec) and radiopharma (e.g, Rayze takeout in Dec)
7. Substantial growth in the follow-on market as returning investors seek large blocks of quality biopharma companies.

More Capital Markets Predictions in 2024 (continued)

8. Substantial increase in IPO activity:
   a) Mid to late stage therapeutics are favored. We don't see a return to preclin IPOs as we had in 2021
   b) A few big AI stories get out like Valo. Interest in how AI impacts biopharma remains off the charts
   c) More obesity/CV companies get out like Kallyope and Rivus
9. Significant increase in equity privates:
   a) We could easily set an all-time volume record in the equity privates area in 2024
   b) Activity slowed down a lot in 2023 but as the market picks up, the many well financed funds will stop throttling back investment volume and shift to an offensive stance on deploying capital – can't raise a new fund until you deploy the old one
   c) PIPE interest remains off the charts and PIPE deals remain quite important throughout the year
   d) Healthtech efforts of groups like Andreesen Horowitz/GC etc continue to be really interesting
   e) Incursion of tech VC's into healthcare accelerates – particularly at the margins (e.g., AI in drug discovery)
10. The "old days" stay the "old days“ – generalists don't take over and healthcare specialists continue to rule:
    a) Twenty years ago, specialty funds less important and retail/generalists drove the market - creating enormous swings etc.
    b) We are going to see well-performing healthcare specialist funds like Cormorant, Deep Track and RA get a lot bigger in 2024
    c) The ability of these funds to move/influence/drive small/midcaps is going to grow
    d) While generalists come back and retail comes back the world will be much more specialist influenced than ever before
    e) PE/biotech hybrid funds like General Atlantic and Patient Square that are able to gather funds well (especially from MidEast), get greater influence. Others (e.g., Abinrgworth/Carlyle, Blackstone, Goldman, JP Morgan, KKR, TPG) work hard to grow.

Key Biopharma Themes for 2024

1. Continued shift towards big drugs for big diseases - this theme is just getting started:
   a) Obesity gets even bigger than we think it can as more data comes out (e.g., Amgen, Roche)
   b) The waning dominance of oncology in biopharma continues. Oncology is now just another TA to pay attention to.
   c) Cancer ultimately becomes one of the very biggest areas of interest in pharma but only when we get good pan-cancer drugs. We don't think is in the cards for 2024.
   d) Investors become far more discerning about oncology drugs for small markets or drug candidates that make incremental contributions to treatment guidelines.
   e) Emerging areas in oncology like NK's, Tregs, vaccines don't catch fire.
2. Cardiology gets even hotter with particular interest in highest unmet needs such as heart failure (e.g., Cardurion, Cytokinetics), hypertension (e.g., Mineralys), rhythm disorders, atherosclerosis and PAD.
3. Asthma/COPD/IPF get a lot bigger
4. Despite valiant efforts we don't see big breakthroughs in fibrosis in 2024
5. In the liver area, thyroid hormone receptor-β agonists and FGF21's don't do as well as some hope.
6. Diabetes starts to become more nuanced as biopharma revisits the all-important insulin sensitizer and starts to appreciate emerging approaches to the beta cell dysfunction (e.g., Hua Med/Biomea)

Market Themes for 2024 (continued)

7. More consolidation on payor/provider side which continues to put pressure on pharma:
    a) Pressure on pharma from United/CVS/Humana (step edits/rebates/pricing drops) gets worse than before
    b) PBM reform does not happen but pressure from new entrants continues to catalyze sector change
    c) Reform of Medicare Part B rules including strong prevailing incentives to prescribe expensive biologics does not happen
    d) A big pharma does something dramatic with payors – perhaps a subscription type model for obesity drugs
    e) Ironically, generics industry continues its comeback. It's so beaten down there is only one direction: up
8. I&I focus starts to differentiate more and B-cell gets ever bigger (we really like emerging stories like Nuvig, Seismic, Avilar, Biohaven, Lycia, Zenas)
9. Neuro is the rising star of the year as breakthroughs continue, particularly in areas like psych (e.g., Neumora for MDD/orexins for sleep), PD (e.g., Bluerock/Ryne), epilepsy (e.g., Neurona) and FTD (e.g., Alector)
10. Despite good data and a donanemab approval, the Alzheimer's market doesn't really move like we all wish it would:
    a) Requirements for testing, co-pays, preauths and patient monitoring with the current crop of amyloid clearance mAb's aren't enough to convince the kids to go through the hoops for their memory-impaired parents.
    b) If a company like Prothena / Vigil can show more "game changing" evidence of improvements in cognition (in the eyes of consumers), it's a new day but we don't think this happens in 2024.
    c) That is, the cognition/AD market is like the obesity market before the drugs got a lot better. There are sales - billions even - but it doesn't get gigantic. The moment a drug comes that stops cognition decline in its tracks, the game is completely different.

Market Themes for 2024 (continued)

11. ADC's continue to excel:
    a) Less interest than before in immune cell engagers
    b) Hybrid platforms interesting. For example, we are watching Sutro's immune + ADC engager platform with interest
    c) We are watching pan-tumor targets like CTLA4 and Epcam with interest for data in 2024 (e.g., CytomX/BioAtla/Inatherys)
12. Private equity comes roaring back and is a lot more sophisticated than before - more and more platforms understand the life sciences sector well. PE likes life sciences and seeks ways to remove cyclicality from its bets in area
13. Credit markets recover. With lower rates access to debt capital improves and benefits capital structure focused players
14. Big pharma strategy continues to evolve:
    a) More interest in involvement with health systems / population health
    b) More interest in top-down strategies like that of Vertex versus gap filling in specialty markets
15. Pricing mistakes continue to get fixed in biopharma where hidden gems are abundant such as Amylyx/TG in spec pharma or Puretech/Roivant which follow the hub & spoke model.
16. Money flows heavily into specialty pharma in 2024 due to abundance of bargains
17. CRO industry grows and consolidates further
18. Tech enabled healthcare services sector continues to explode
19. AI effect on health systems starts to become real – the market starts to see the transformative effects of AI in health delivery
20. China’s importance to our ecosystem gets bigger as the wave of biopharma innovation continues there

How The Market Could Play Out in 2024

As the saying goes history never quite repeats itself but it does rhyme.

We have been through a reasonably similar time before – the dotcom collapse of 2000/2001.

Biotech plummeted by more than 70% as genomics names like Human Genome and Incyte couldn't find interested investors in the bio-apocalypse of 2001. The market got steadily worse and hit bottom some time in mid 2002. As in 2023, the market got better in 2003 with Novartis buying Idenix and the merger of Biogen and Idec. The fundamentals were quite positive with numerous approvals that year.

A key development at that time was investors deepening appetite for taking risk. Those with long memories will remember that some great companies raised money in 2003. There were seven IPOs on the Nasdaq in '03 for more than $25mm raised compared to only four in 2002. In 2004 we saw 27 companies go public and then 24 go public in 2005.

A key IPO in 2003 was for Myogen (bought by Gilead for $2.5bn in 2006). We see 2024 as a year that will be similar to the 2004/2005 period period. Good companies will be able to go public and the IPO market is healthy.

2024 will be a big year for raising capital.

We see 2024 as a year when biotech and growth players in life sciences will raise substantial capital as investors have money that needs to put to work and will fear losing out on the ongoing M&A wave.

How The Market Could Play Out in 2024 (continued)

If one looks at the M&A activity of 2021 to mid-2023 there was a preponderance of buying of companies that already had demonstrably good data or products.

This then started to shift. In M&A deals like Cerevel, Chinook and Rayze we saw pharma buy companies that were clearly good but had their best data in front of them.

Pharma started to take on a bit more risk in dealmaking in order to pick up the highest quality opportunities at prices that were relatively affordable.

The implications for biotech investors could not be clearer.

If pharma is getting in front of good data on the licensing/M&A side, the savvy investor needs to be at least one step ahead of this.

Our sense is that many specialist investors have been thinking just this way – but perhaps not quite enough. We are seeing pickups in value of pre-data companies where investors are taking positions that they think will pay off. We would note, for illustration, the large positions that EcoR1 has taken in names like Prothena and Anaptys. Like a good surfer, EcoR1 sees “big waves” coming and is positioning well ahead of time when the risk/reward is most attractive. We expect to see a lot more buying of good stories in 2024 ahead of data as investors speculate as to which companies will be able to deliver on their promises.

Good surfers know to position right to catch the wave.

How The Market Could Play Out in 2024 (continued)

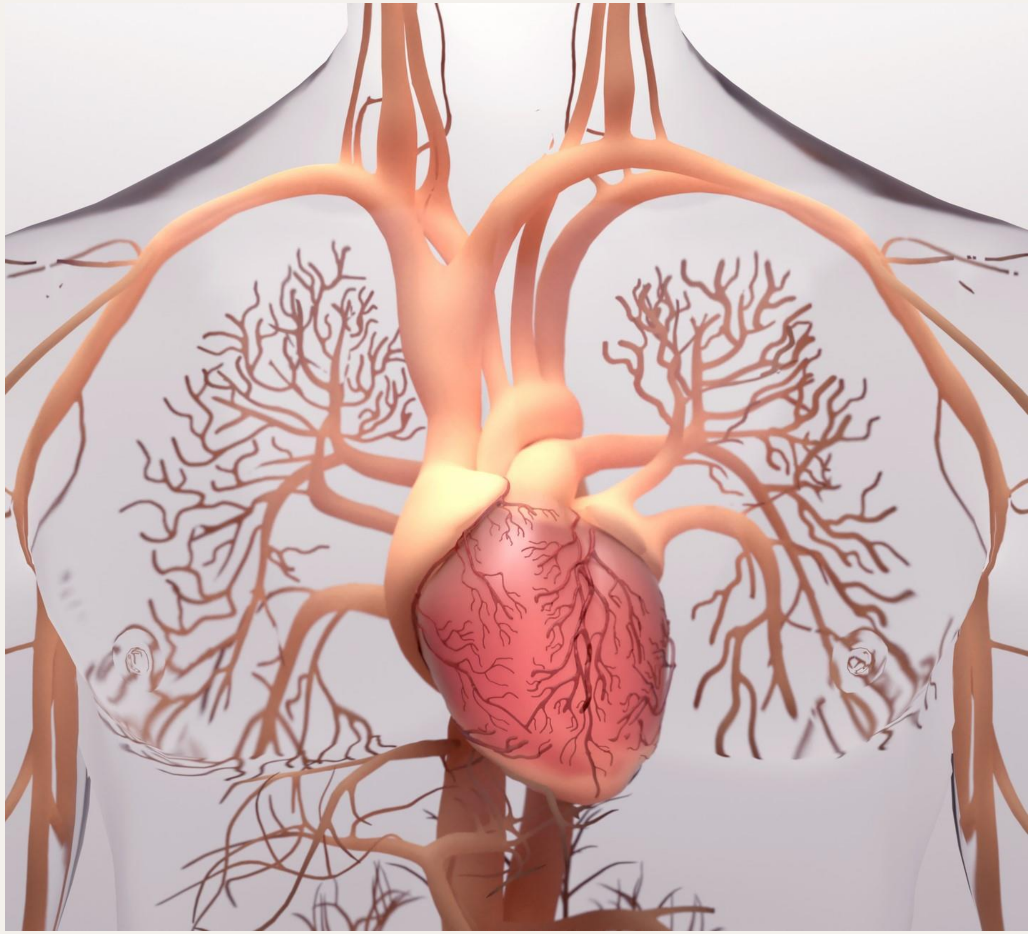
In past issues and throughout this issue we have emphasized the changes that are taking place in big pharma.

Traditionally the big buyer in our sector, most big pharmas find themselves in an existential situation where they are delivering on goals for pipeline but not seeing share price appreciation. The rules of engagement have changed as investors are now looking for gigantic products that overcome the negative gravity field created by competition, pricing pressures and an ever choosier FDA. Building a long-term growth story in pharma has become ever tougher.

Big pharma has excelled in the last two decades on the back of biologics, oncology drugs, rare disease drugs and specialty pricing (relatively high prices for drugs aimed at niche markets).

Payors are also ever more powerful. It's not just the U.S. government and the IRA. Most major commercial payors and providers in the U.S. are shifting away from a fee-for-service to a value-based care world where the priority is on managing large chronic diseases. Over 90% of Medicare spend is focused on patients with one or more of six large chronic conditions.

Payors are just not that interested anymore in reimbursing hundreds of billions in spend on cancer, rare disease and the like when their bills for cardiac conditions, respiratory conditions and psychiatric conditions are piling higher.



Payors are highly focused on major chronic diseases like heart failure and COPD.

How The Market Could Play Out in 2024 (continued)

This is obviously the core reason that the “real drugs for real diseases” theme is taking over the pharmaceutical industry.

Pharma learned in early 2000’s that a great way to get paid was to deliver life saving cancer drugs to patients in real need.

Now the focus is shifting towards those chronic diseases that cost the system large amounts of money. If COPD and heart failure cost Medicare $20k+ a year per patient and there are millions of patients, then there is a huge market opportunity for a drug that works really well.

Given the momentum towards a capitated value-based system, the growth of this trend is going to be unstoppable for at least a decade to come.

We believe that the shift towards CVM, respiratory, psychiatry, kidney etc. is going to *accelerate* in 2024. This big disease thing is no passing fad. Chronic disease drugs are going to become the **mainstay** of the pharma sector going forward.

We applaud Roche for seeing this in 2023, getting tooled up and taking decisive steps to reenter the CVM market – one that they once knew well.

It’s important to note that the biggest trend of all, **obesity drugs**, is not yet an area where Medicare reimbursement is in place. As Lilly and Novo show more outcomes data on what weight loss means, this reimbursement could become possible but we have, conspicuously, not seen major recent movement here.

The money is shifting towards diseases a primary care doctor might treat.

How The Market Could Play Out in 2024 (continued)

But there is an even larger trend emerging here.

The truth is that today's user of GLP-1 agonists is more likely to be a near normal weight woman in Beverly Hills than a morbidly obese poor person in Mississippi or Alabama.

Overwhelmingly, GLP-1 users are private pay patients based in coastal areas where incomes are higher.

If anti-vaxxers tended to be Trump Republicans found in Missouri or Wyoming, then GLP-1 users tend to be more Democratic, wealthier, more health conscious and much more likely to live in a wealthy coastal city.

What's interesting is just how big this market is. We have previously estimated that based on recent surveys the *private pay* market alone for obesity drugs in the U.S. could go over $100 billion in size.

That's stunning.

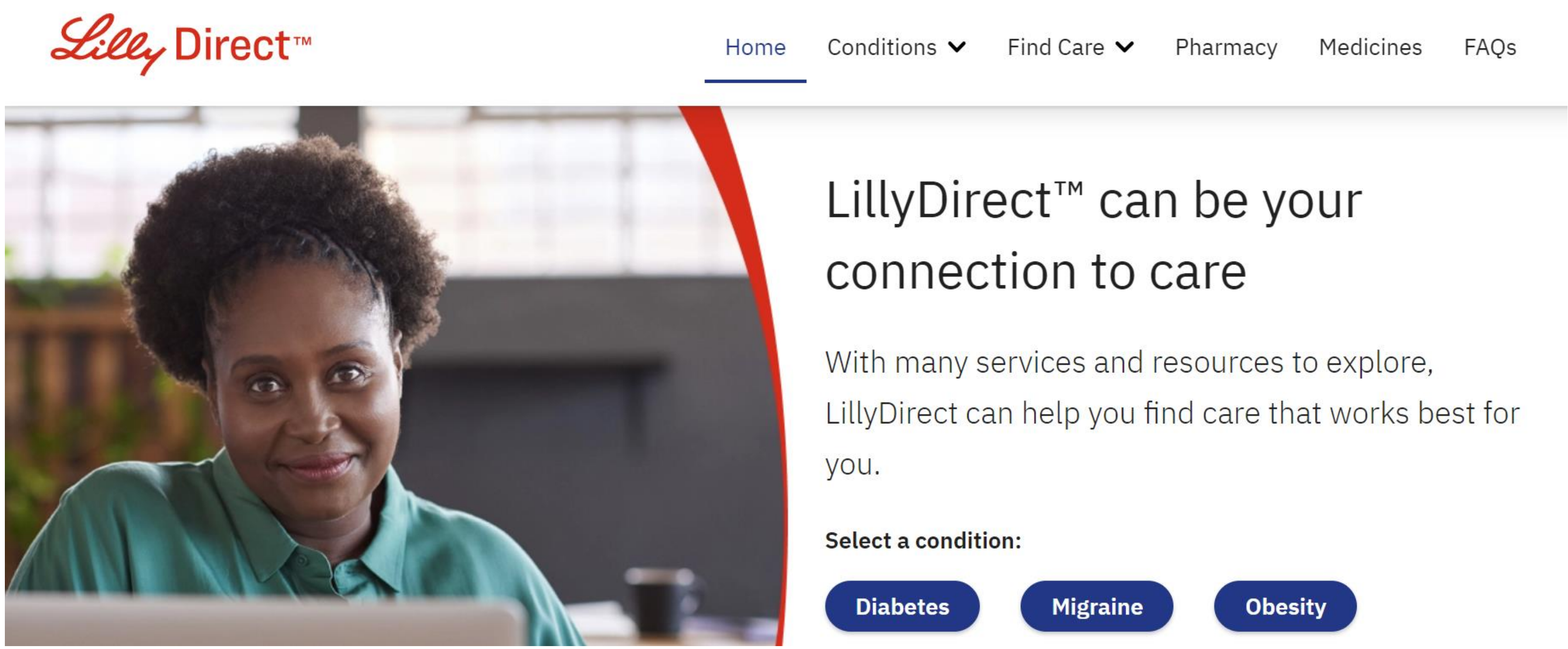
The entire business model of pharma can be shifted by providing consumers what they really want.

To be thin. To live longer. To be able to quit smoking. To get rid of their diabetes. And so on.

It strikes us that the modern obesity drug is profoundly disruptive to the existing ecosystem that delivers and pays for medicines in the US.

Because of poor reimbursement, today's obesity drug user is more likely to be found shopping on Beverly Hills' Rodeo Drive than in a Walmart in Southern Alabama.

How The Market Could Play Out in 2024 (continued)



Lilly's move, announced on Jan 4, 2024, to provide home delivery of pharmaceuticals via Lilly Direct is highly aligned with the giant private pay, direct-to-consumer opportunity for obesity drugs.

Lilly has effectively entered the healthcare services industry and is now interacting with actual patients rather than working just through distributors and wholesalers.

It's an overdue and a highly disruptive step.

Lilly is allowing consumers to directly access and receive access to diabetes, migraine and obesity drugs. Without going through PBM's, pharmacy chains, distributors and the like.

How The Market Could Play Out in 2024 (continued)

Core power structures of our society could be affected by the rapid shift of drug consumption to the private pay market in the US. In the same sense that a SpaceX or Alphabet have a seat with governments at the global power table, access to large private pay markets are profoundly empowering for pharma and threatening to governments.

Eli Lilly and Novo Nordisk could tell CMS to jump in a lake and wouldn't lose that much market cap. With obesity drugs, pharma has found a way to grow their business that involves directly pleasing the end customer.

Parts of the U.S. market is starting to look like that of China – where the consumer pulls out their own credit card to pay for the drugs that they need.

And these drugs are societally important. Indeed, important for our civilization.

There are obvious issues of economic justice insofar as access to these drugs has been denied to much of the U.S. populace who aren't well off. Imagine if a politician said that if you elect me, I will make sure that the U.S. government will allow you to buy Ozempic® for not more than $25 a month. That would get a lot more votes than bashing pharma for the umpteenth time.

There are now more than a few biotech's focusing in on the obesity opportunity.

The single biggest trend of 2024 will be the definition of what the obesity can become. The introduction of new approaches to managing the harm of obesity, particularly via orals and non-GLP1 approaches is going to be fascinating and a major topic in 2024. We expect to see more than a few twists and turns in this exciting area.

Pardon the pun, but obesity drugs are going to be huge in 2024.

Macro and the Markets

Federal Reserve Bets on Smooth Landing Even as Economists Anticipate a Bumpy Ride

Claire Jones, *Financial Times*, Dec 28, 2023

This time last year, most economists expected the US Federal Reserve would be spending 2023 facing down a recession while fighting against the biggest wave of inflation for a generation.

Instead, the US has achieved the strongest growth of any large economy, unemployment is close to record lows, and price pressures are showing signs of creeping back to the central bank's target of 2 per cent.

That better than expected run of data has led Fed chair Jay Powell to end the year by betting the credibility of the board he chairs on next year being almost as good as this one.

At its most recent rate-setting meeting, the Fed released its latest data showing that officials' expect the central bank to cuts its benchmark federal funds rate — currently at a 22-year high of between 5.25 per cent and 5.5 per cent — by 75 basis points over the coming 12 months.

Baked into the forecasts from the Federal Open Market Committee is a belief that the US economy will achieve its soft landing, with inflation returning to the Fed's goal, growth slowing only mildly and unemployment still reasonably low.

Source: https://www.ft.com/content/2a74ff27-56b4-40bf-8d9f-5f58c5627058

Soft Market Open in 2024 Due to Uncertainty Expressed in FOMC Minutes Released on Jan 3, 2024

Jeff Cox, *CNBC*, Jan 3, 2024 (excerpt)

Federal Reserve officials in December concluded that interest rate cuts are likely in 2024, though they appeared to **provide little in the way of when that might occur**, according to minutes from the meeting released Wednesday.

At the meeting, the rate-setting Federal Open Market Committee agreed to hold its benchmark rate steady in a range between 5.25% and 5.5%. Members indicated they expect three quarter-percentage point cuts by the end of 2024.

However, the meeting summary noted a high level of uncertainty over how, or if, that will happen.

“In discussing the policy outlook, participants viewed the policy rate as likely at or near its peak for this tightening cycle, though they noted that the actual policy path will depend on how the economy evolves,” the minutes said.

Officials noted the progress that has been made in the battle to bring down inflation. They said supply chain factors that contributed substantially to a surge that peaked in mid-2022 appear to have eased. In addition, they cited progress in bringing the labor market better into balance, though that also is a work in progress.

The “dot plot” of individual members’ expectations released following the meeting showed that participants expect cuts over the coming three years to bring the overnight borrowing rate back down near the long-run range of 2%.

Source: https://www.cnbc.com/2024/01/03/fed-minutes-december-2023-.html

Fed Tightening Episodes Average 15 to 20 Months

Historical precedent would suggest ending of the Fed's tightening policy going into 2024.

FOMC Tightening Episodes: 1983 to 2018

First Tightening Action	Initial FFTR Target (%)	Final Tightening Action	Final FFTR Target (%)	Total Tightening (percentage points)	Yield Curve Inversion?	Business Expansion Peak
March 31, 1983	8.50	Aug. 9, 1984	11.50	3.00	No	N/A
March 29, 1988	6.50	May 16, 1989	9.81	3.31	Yes	July 1990
Feb. 4, 1994	3.00	Feb. 1, 1995	6.00	3.00	No	N/A
June 30, 1999	4.75	May 16, 2000	6.50	1.75	Yes	March 2001
June 30, 2004	1.00	June 29, 2006	5.25	4.25	Yes	December 2007
Dec. 16, 2015	0.00-0.25	Dec. 19, 2018	2.25-2.50	2.25	Yes	February 2020
Average tightening across all six episodes:				2.93		
SOURCES: Federal Reserve Board of Governors, Federal Reserve Bank of St. Louis and NBER.						
NOTE: "N/A" indicates that a recession didn't follow the tightening episode.						

Source: https://www.stlouisfed.org/on-the-economy/2022/apr/fed-tightening-episodes-since-1980s-part-one

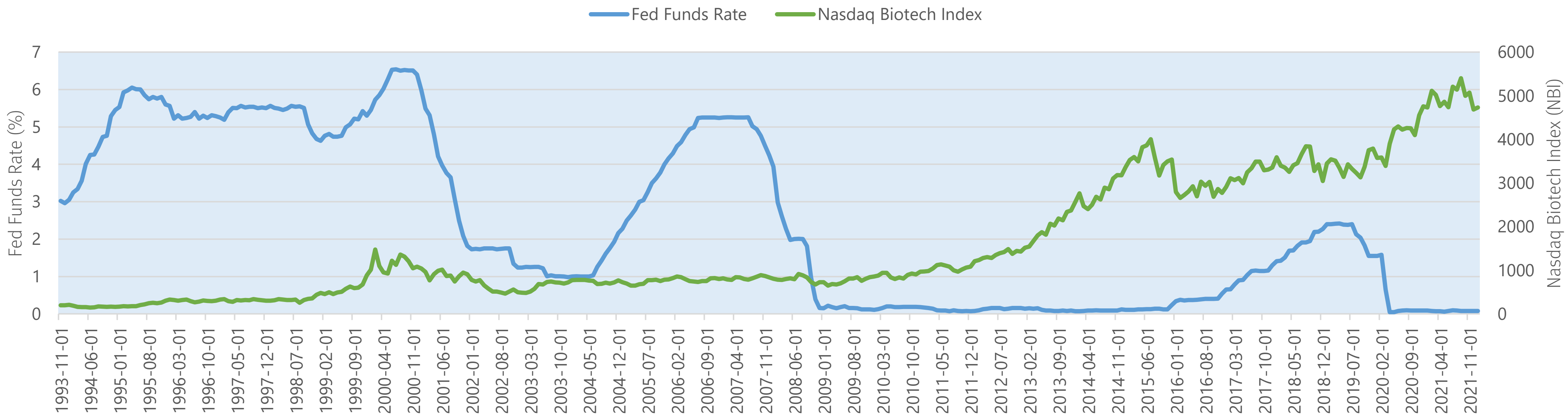
Important to Recall that Biotech Typically Recovers Well Before Fed Easing Begins

On average, since 1994 the Nasdaq Biotech Index (NBI) has gone up 68% of the time.

Only four of the last 28 years have seen the Fed initiate a tightening cycle, marked by an increase in Fed Funds.

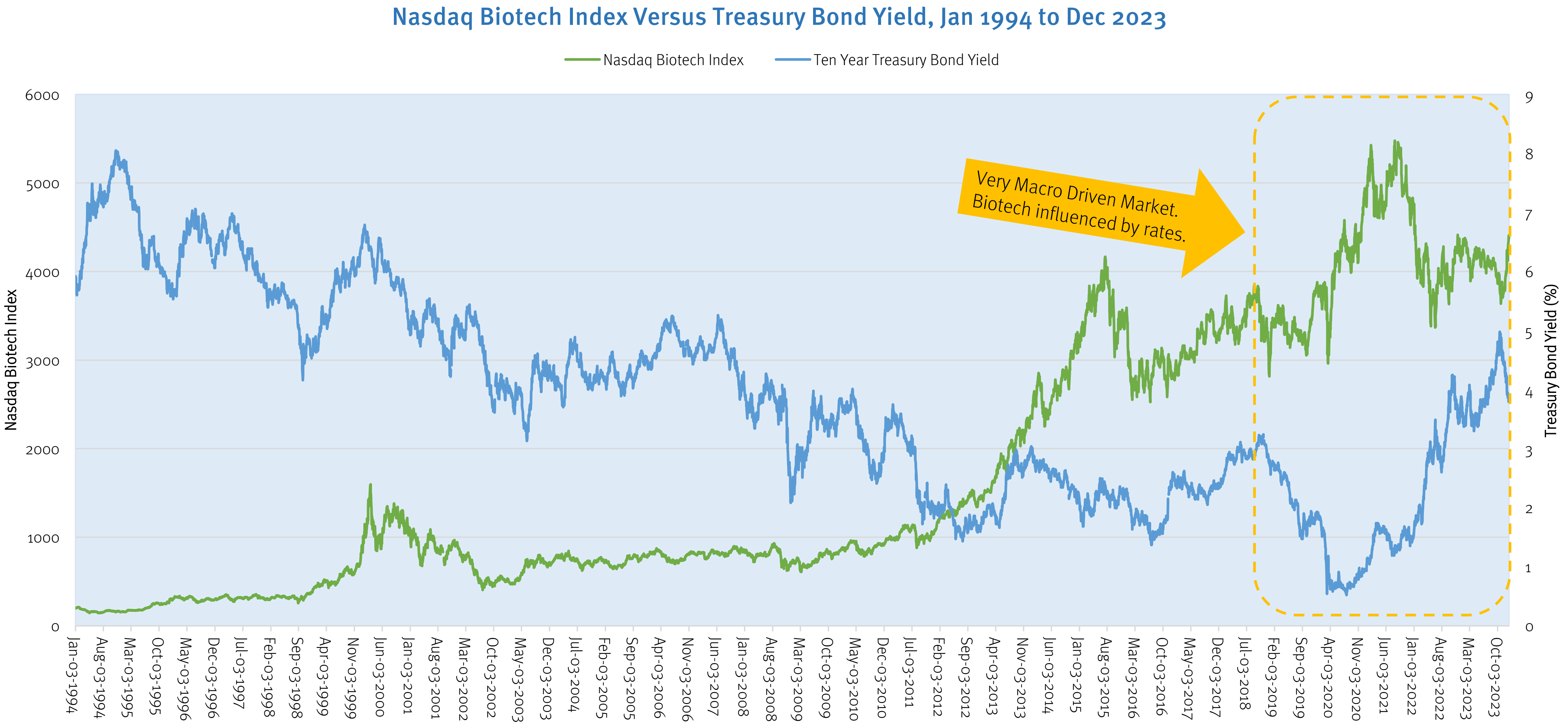
The NBI rose by year end in **three of those four years** (75%). Current negative market conditions are easing fast as investors anticipate the actions of the Federal Reserve in 2024.

Fed Funds Rate versus Nasdaq Biotech Index, 1993 to 2021



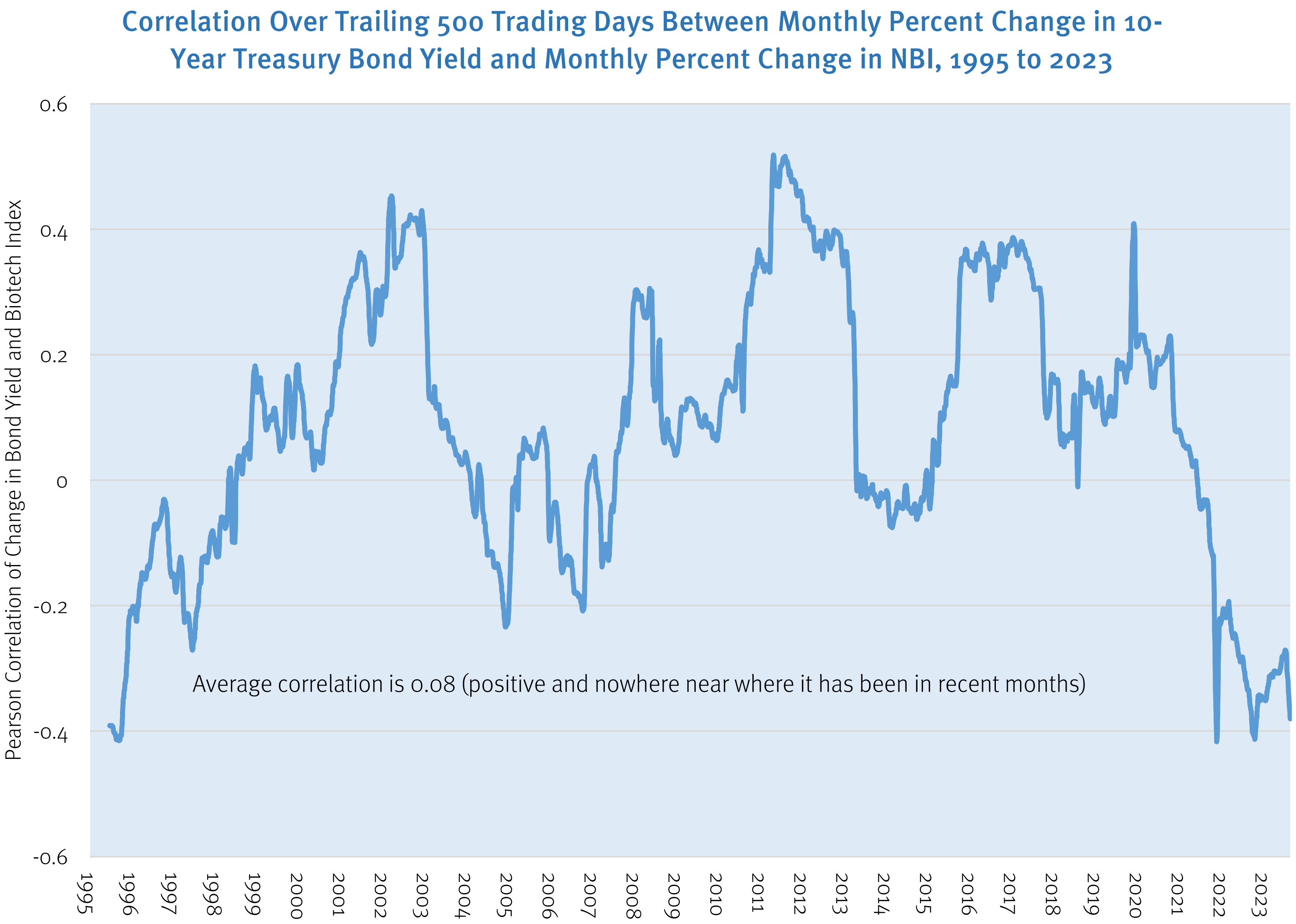
Source: Fed Funds rate from FRED, Federal Reserve Bank of St. Louis. NASDAQ Biotech Index from CapitalQ.

Macro Factor Has Been Critical Since 2020…



Source: CapitalIQ.

…But Macro Factor Not Always So Important



Going forward, we expect macro to become a lot less important. The biotech market will be influenced much more by developments within the field itself and ebbs and flows of funds driven by retail and generalist interest in the sector.

To explain, we have been in a period for several years where increases in rates have been associated with declines in biotech values.

The reason is an obvious one. When long rates go from less than two percent to close to five percent, the effect of time discounting on biotech values is much more important.

Thus, we have seen substantial *negative* correlation between monthly change in Treasury yields and the Nasdaq Biotech Index.

But looking back over the last 30 years, this "macro on the biotech steering wheel" phenomenon has been anomalous. The last time where we saw such a large negative correlation was in the mid-1990s. This was a similar period. The Fed raised rates sharply and then eased in 1995. As this happened, the market rose sharply.

Source: CapitalIQ and Stifel analysis.

Geopolitical Pressures May Ease in 2024

We saw 2023 bring into the open a loose axis of interests between China, Russia, Iran, North Korea and their proxies. While this axis is ultimately threatening to global stability and the markets, it is remarkable how little real progress was made by Russia and Iran in 2023. Both states appear to playing for spectacle rather than realistically aiming for ultimate victory (takeover of Ukraine or extinguishment of Israel). If our ability to predict the biotech market is limited, it is even more so in geopolitics. Nonetheless, it appears that there is a realistic possibility of less geopolitical risk in 2024 than 2023 given how the chessboard has played out in recent months. We are optimistic that 2024 will be a year of geopolitical calm.

China – U.S. Friction Over Taiwan

We are not experts on China politics but recent easing of tensions between the U.S. and China has been notable. The Chinese government faces significant internal economic issues and President Xi has been continuing to focus on domestic matters while continuing to increase dialogue with U.S. counterparts. Our sense is that China is playing the long game here recognizing that the U.S. has a Presidential election coming up and that a Republic victor could be worse for them.

Russia – Ukraine War

While Ukraine has not been successful in removing Russia from its soil the toll of the war on Russia is unmistakable. Russia faces high inflation and, tragically, a shrinking population due to war losses. Russia has been losing 10,000 troops per km gained around Avdiivka, Ukraine. A late December "all out" missile attack on Ukraine caused less than fifty lives lost. Ultimately, a stalemate works against the attacker and it appears likely that the Ukraine situation will not boil over into something bigger in 2024.

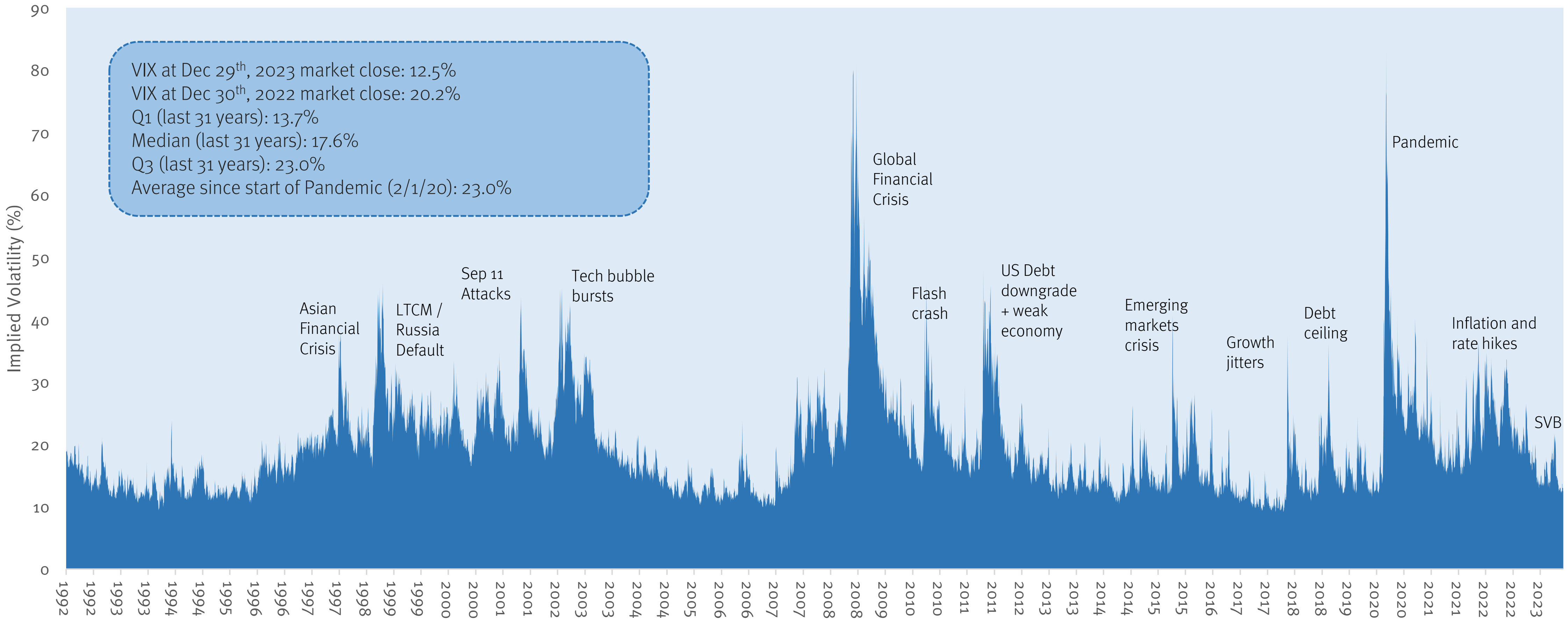
Israel – Hamas Conflict

Unlike Ukraine, the Israel war against Hamas is not a stalemate. Israel appears likely to succeed in removing Hamas from Gaza in 2024 - the only territory where they have a governance foothold. The Red Sea conflict triggered by the Houthi rebels and Iran appears to be de-escalating with a U.S. presence. Hezbollah have not attacked Israel with good reason. While wider regional conflict remains possible, most reports indicate that Iran has little stomach to ramp up offensive efforts given recent developments.

Market Volatility Measured by VIX is Way Down

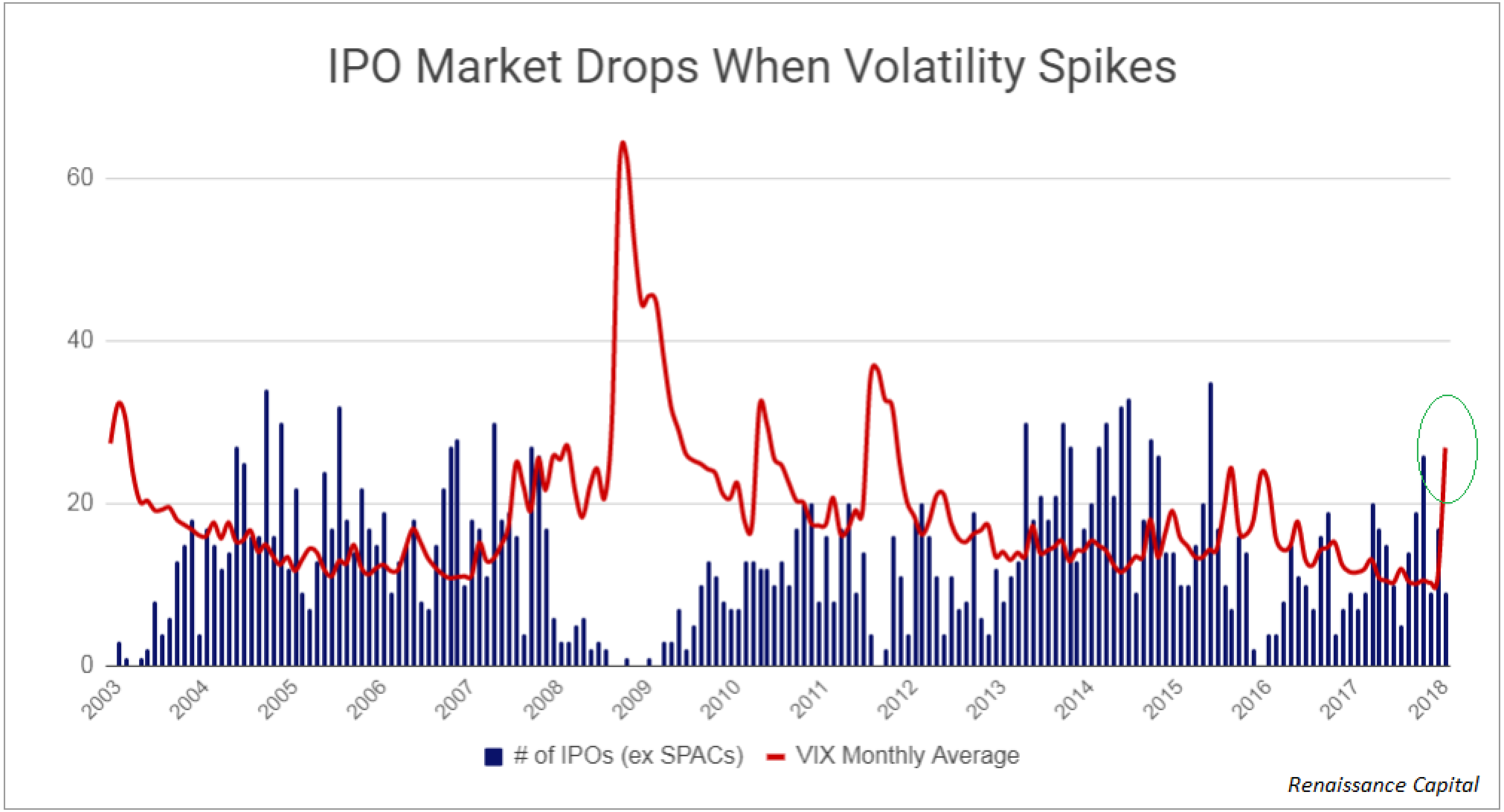
The Pandemic period was remarkable for high market volatility. The VIX, a measure of investor fear, has averaged 23% since the Pandemic began. It was only during 2023 that we saw the VIX come way down. Today's value of 12.5% is in the 14th percentile of the distribution of VIX levels since 1992. It's well understood that a low VIX is a positive for market performance and for biotech issuance activity, especially IPOs.*

VIX - Implied Volatility on CBOE S&P 500 Option Contracts, 1992 to 2023



Source: CapitalIQ. * See, for example, Bannerjee et.al., (2007): https://www.sciencedirect.com/science/article/abs/pii/S0378426607000490.

IPOs and Volatility: 2003 to 2018



Source: https://seekingalpha.com/article/4145408-what-happens-to-ipo-market-when-volatility-spikes

Smiles All Round As Markets Ended 2023 On A High Note

Graeme Wearden, *The Guardian*, Dec 31, 2023

Global financial markets confounded gloomy expectations in 2023. Stocks rallied, and bonds reversed heavy losses made early in the year as recession fears were replaced by growing confidence that US policymakers would achieve an economic soft landing.

At the start of the year, many investors were expecting corporate earnings to decline as the US economy was dragged into recession by high borrowing costs. But it avoided a downturn, despite US interest rates rising to a 22-year high. Growth has beaten forecasts, while US corporate profits hit a near record in July-September. Relief at the US's strong growth in 2023 helped counter concerns over China's recovery, and the slow pace of the European economy, which ended the year teetering near recession.

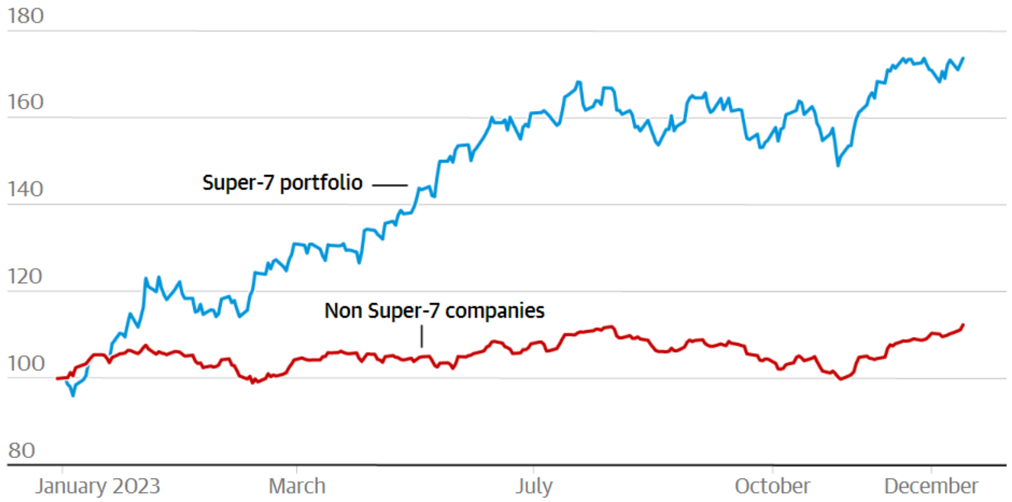
The MSCI World Index, which tracks shares in 47 countries, had a rollicking year, rising more than 20% since the start of January. Trading was volatile, though – with share prices going up through the first half of 2023, before sliding from August until October.

But then an "everything rally" began in November, as falling inflation spurred hopes of interest rate cuts on both side of the Atlantic. Then, in December, stocks surged after America's top central banker, Jerome Powell, fanned hopes that borrowing costs had peaked.

America's S&P 500 index, a broad gauge of US stocks, gained 25% over 2023, notching up a record high. The tech-focused Nasdaq Composite jumped by about 45%, led by the "Magnificent Seven" – Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla. And the Nasdaq 100 index of large tech stocks had its best year since the dotcom bubble burst, rising by more than 50% to end 2023 at a record high, driven mainly by mega tech stocks. America's stock market rally was impressive, but lopsided. About 70% of S&P 500 stocks underperformed the index during the year, with roughly a third falling in 2023.

The Super-7 are up 74% this year compared with 12% for the rest of the world's companies

Weight in Global MSCI all-country world index, indexed to 31 December 2022



Guardian graphic. Source: LSEG Datastream, Schroders.Note: The Super-7 portfolio includes Apple, Microsoft, Alphabet, Amazon, Nvidia, Tesla and Meta. Non-Super-7 consists of the remaining companies in the MSCI all country world index

Source: https://www.theguardian.com/business/2023/dec/31/smiles-all-round-as-financial-markets-end-2023-on-an-unexpected-high

Consensus View Going Into 2023 Was Dead Wrong

Alexandra Semenova, Sagarika Jaisinghani, Liz Capo McCormick and Selcuk Gokoluk, *Bloomberg Business Week*, Dec 28, 2023

"All across Wall Street, on equities desks and bond desks, at giant firms and niche outfits, the mood was glum. It was the end of 2022 and everyone, it seemed, was game-planning for the recession they were convinced was coming.

Over at Morgan Stanley, Mike Wilson, the bearish stock strategist who was rapidly becoming a market darling, was predicting the S&P 50O Index was about to tumble. A few blocks away at Bank of America, Meghan Swiber and her colleagues were telling clients to prepare for a plunge in Treasury bond yields. And at Goldman Sachs, strategists including Kamakshya Trivedi were talking up Chinese assets as the economy there finally roared back from Covid lockdowns.

Blended together, these three calls — sell US stocks, buy Treasuries, buy Chinese stocks — formed the consensus view on Wall Street. And, once again, the consensus was dead wrong. What was supposed to go up went down, or listed sideways, and what was supposed to go down went up — and up and up. The S&P 500 climbed more than 20% and the Nasdaq 100 soared over 50%, the biggest annual gain since the go-go days of the dot-com boom.

It's a testament in large part to the way the economic forces unleashed in the pandemic — primarily, booming consumer demand that fueled both growth and inflation — continue to bewilder the best and brightest in finance and, for that matter, in policy making circles in Washington and abroad.

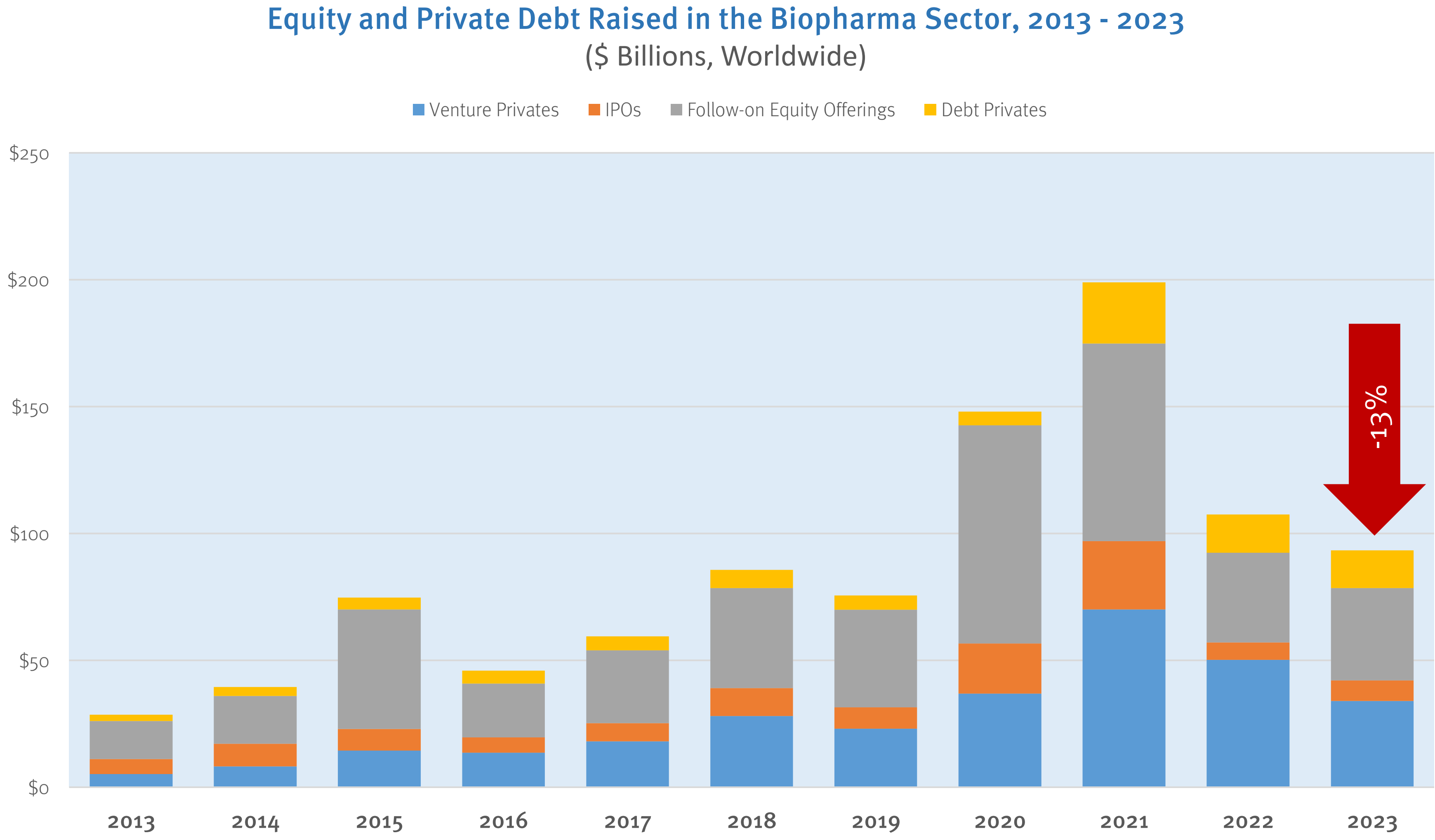
"I've never seen the consensus as wrong as it was in 2023," said Andrew Pease, the chief investment strategist at Russell Investments, which oversees around $290 billion in assets. "When I look at the sell side, everyone got burned.""

Forecasting the economy is hazardous at best.

Source: https://finance.yahoo.com/news/everything-wall-street-got-wrong-000011187.html

Biopharma Market Update

Overall Biopharma Capital Raised To Date In 2023 Was Down 13% Versus 2022



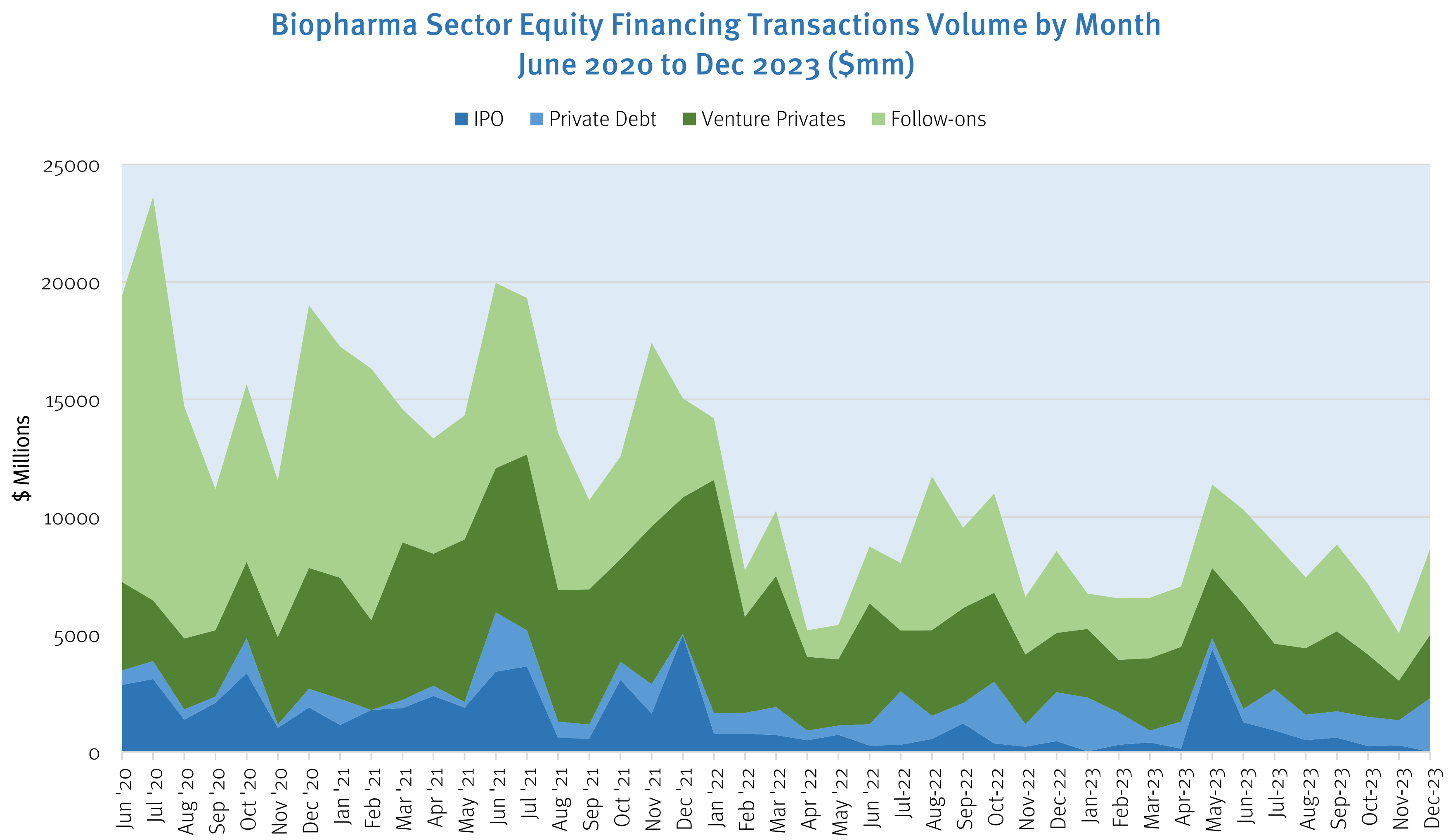
Venture private volumes fell by 32% relative to 2022 as VC's and crossover investors held back investment.

Follow-on activity was up relative to 2022 and IPO activity was flat. Private debt volume was up. The drop in venture privates accounted for the entire drop in capital raising volume in 2023 vs. 2022.

The markets were materially weaker in 2023 than in 2021 and 2022 causing venture investors to pull out of the market.

Source: CapitalIQ and Stifel research

Monthly Biopharma Market Capital Raise Data Shows Market Picked up Substantially in December vs. November 2023



While financing volumes were down somewhat in 2023 versus 2022 it is apparent in this chart that the capital market picked up in December 2023 after the market tanked in late October 2023.

November 2023 was the low point of market activity since the Pandemic period.

Current issuance volumes remain well down from levels seen during the Pandemic.

We expect to see a substantial recovery in 2024.

Source: CapitalIQ and Stifel research

The XBI Closed 2023 at 89.3 Last Week (Up 8.6% for Year)

After a tumultuous year, the XBI closed 2023 up slightly from where it began. Good news on interest rates, inflation and M&A carried biotech and pharma stocks up substantially from their late October low. The biotech market jumped nearly 40% since the Oct 27 low point.

Biotech Stocks Up Last Week

Return: Jan 1 to Jan 3, 2024

Nasdaq Biotech Index: +0.9%
Arca XBI ETF: -1.2%
Stifel Global Biotech EV (adjusted): -2.2%*
S&P 500: -1.4%

Return: Jan 1 to Dec 30, 2023

Nasdaq Biotech Index: +3.7%
Arca XBI ETF: +7.6%
Stifel Global Biotech EV (adjusted): 15.7%*
S&P 500: +24.2%

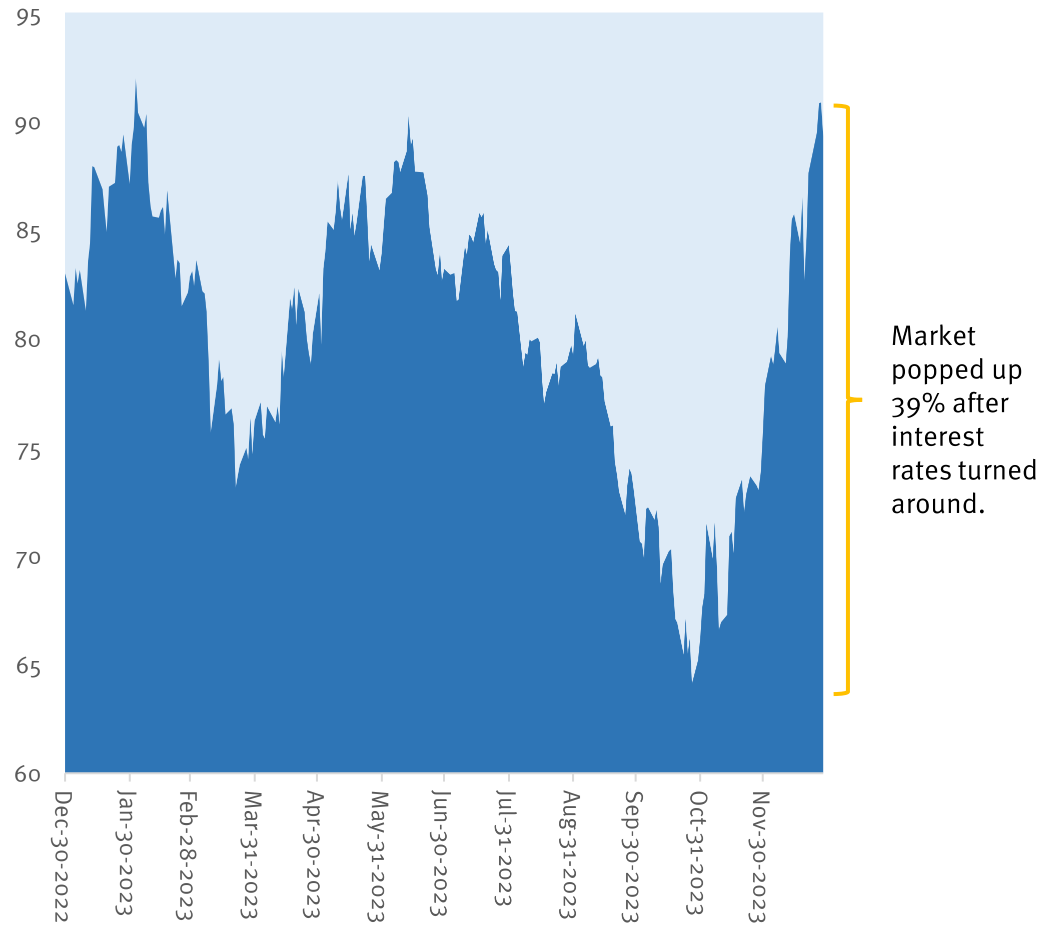
VIX Flat

Jan 20: 19.9%
May 26: 18.0%
July 21: 13.6%
Sep 29: 17.3%
Oct 27: 21.2%
Dec 1: 12.6%
Dec 29: 12.45%
Jan 3, 2024: 13.2%

10-Year Treasury Yield Sub-4

Jan 20: 3.48%
May 26: 3.8%
July 21: 3.84%
Sep 29: 4.59%
Oct 27: 4.86%
Dec 1: 4.24%
Dec 29: 3.88%
Jan 3, 2024: 3.95%

XBI Index, Dec 30, 2022 to Dec 30, 2023



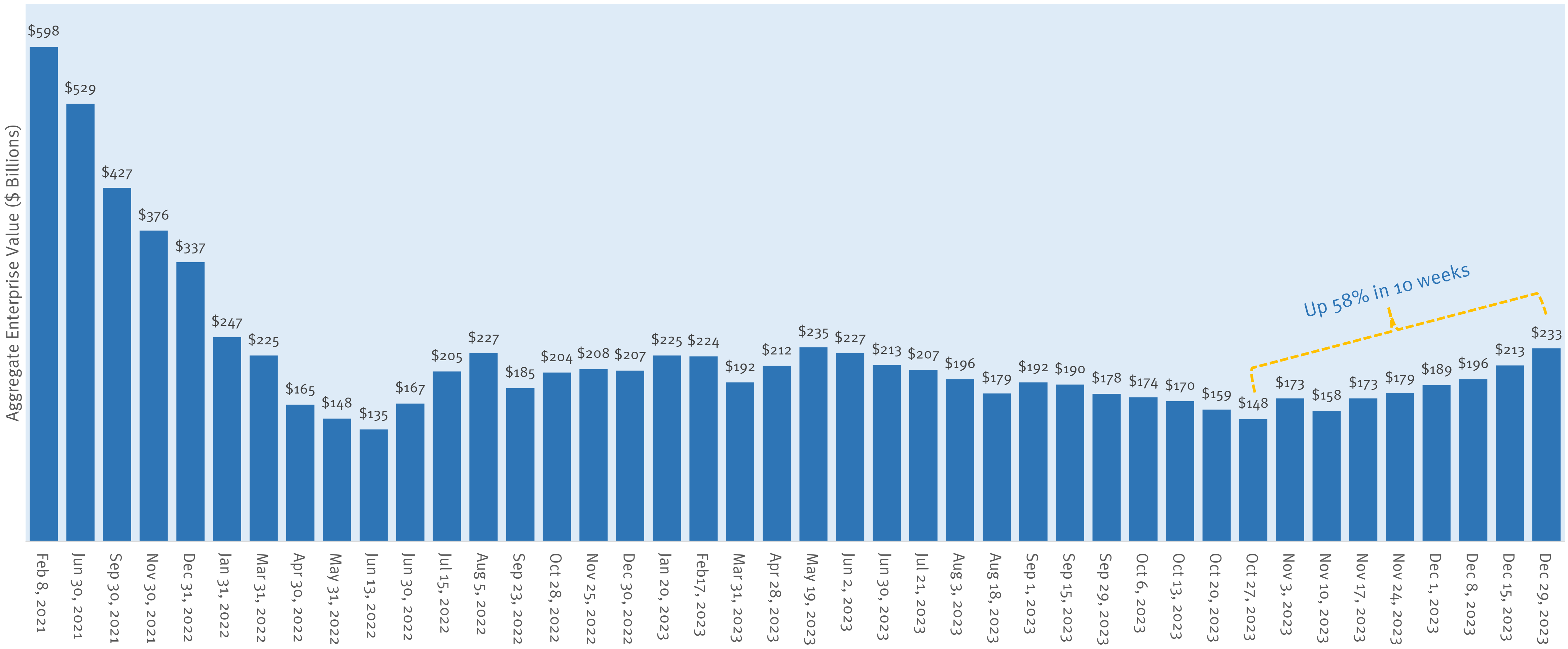
* Change by enterprise value. The adjusted number accounts for the effect of exits and additions via M&A, bankruptcies and IPOs.

Source: S&P Capital IQ and Stifel analysis

Total Global Biotech Sector Rose by 15.7% in 2023

The total enterprise value of the global biotech sector rose by 15.7% in 2023 after adjusting for exits and entries. Biotech values rose a whopping 58% from their recent trough on October 27, 2023 to the close of the year.

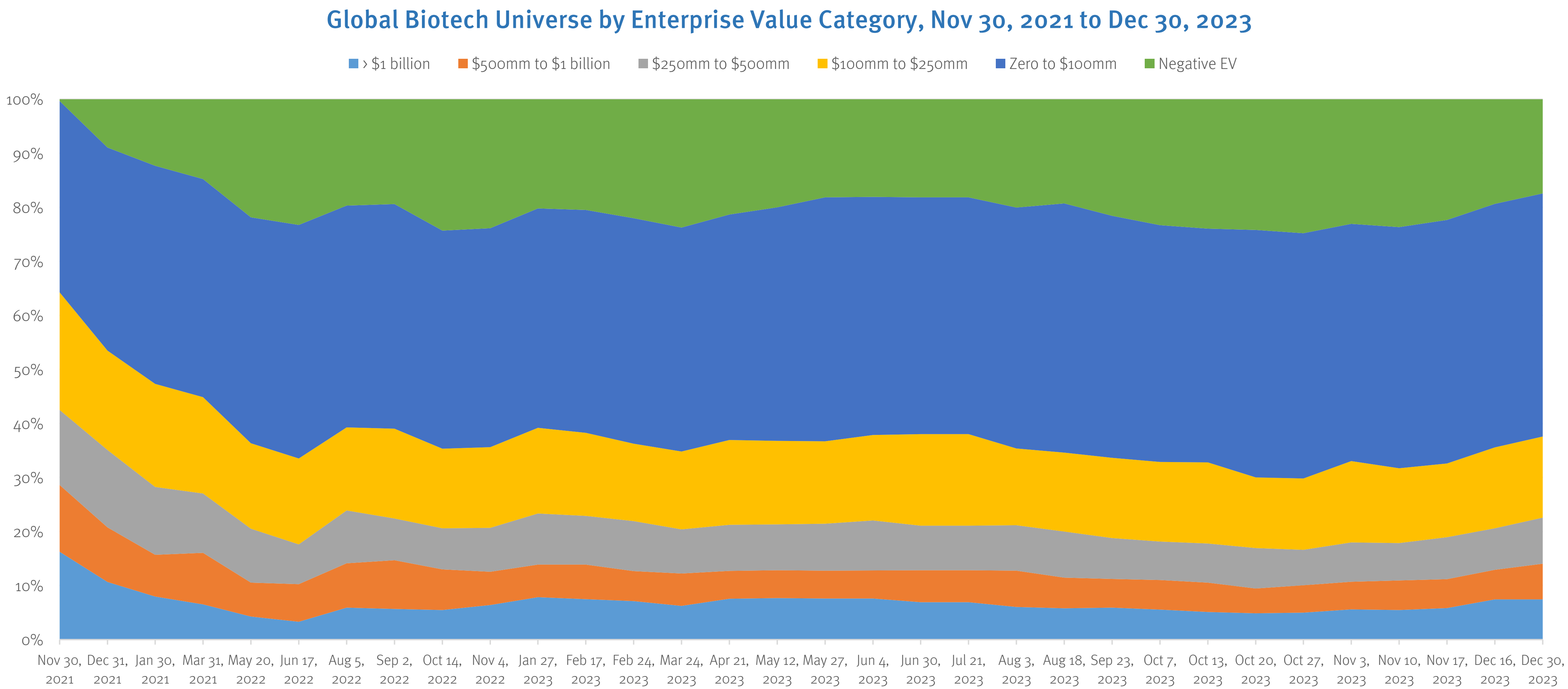
Total Enterprise Value of Publicly Traded Global Biotech, Feb 8, 2021 to Dec 29, 2023 ($ Billions)



Source: CapitalIQ. Biotechs are defined as any therapeutics company without an approved product on any global stock exchange.

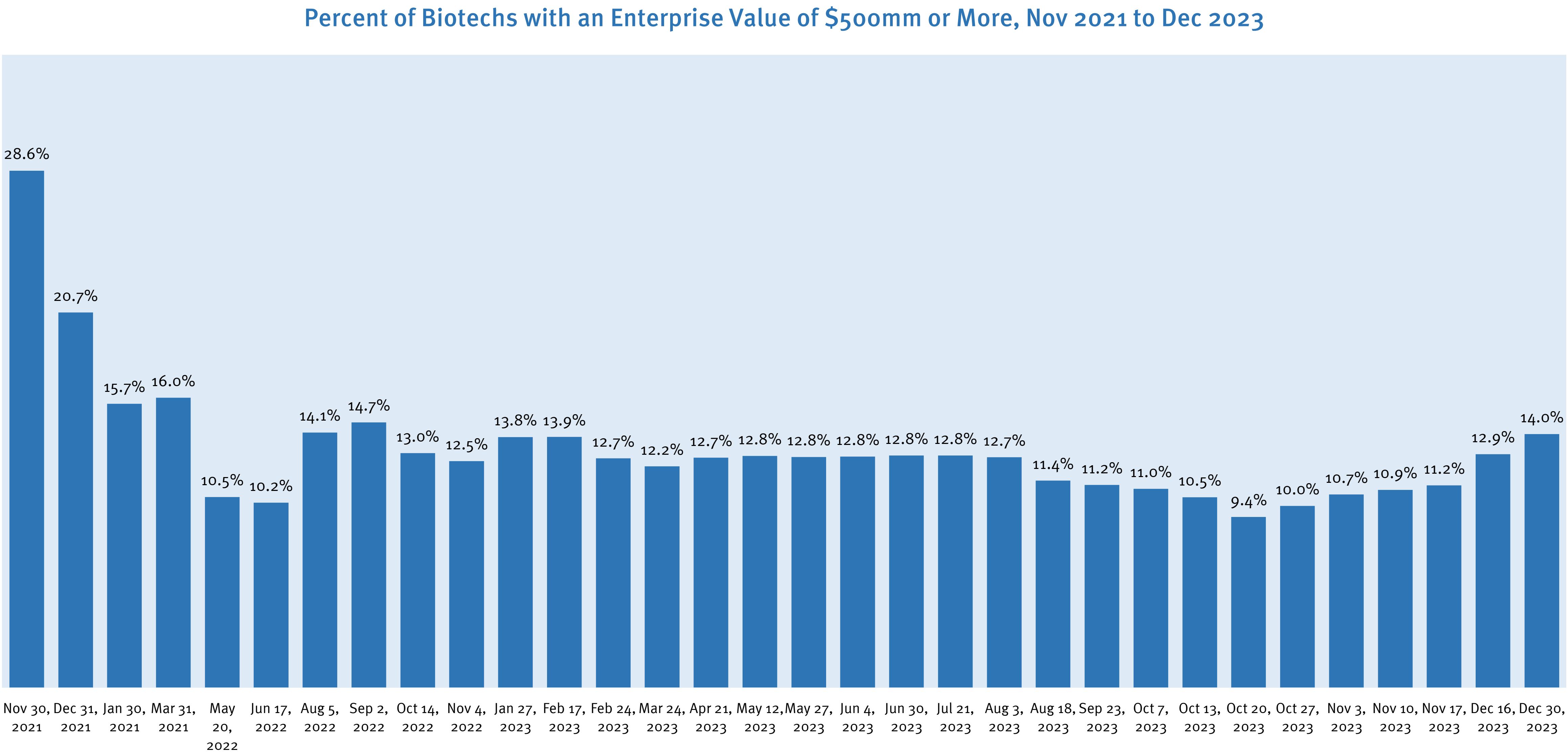
Biotech Neighborhood Analysis

Recent weeks have seen significant reshaping of the global public biotech universe. Far fewer companies today are at negative EV and the count of company's worth $100mm or more has risen rapidly. The biotech sector is well down the long road to normalization.



Source: CapitalIQ

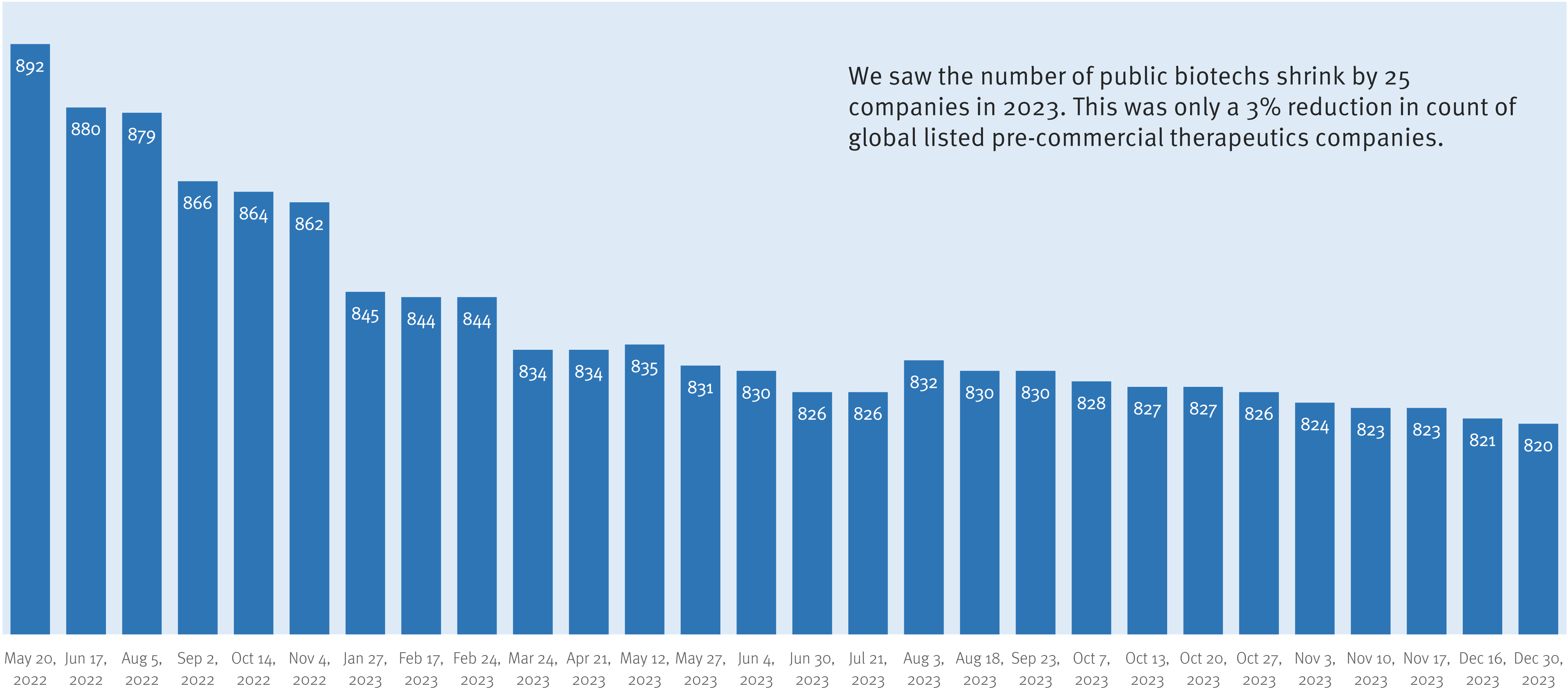
Bigger Biotechs Are Coming Back



Source: CapitalIQ. Biotechs are defined as any therapeutics company without an approved product on any global stock exchange.

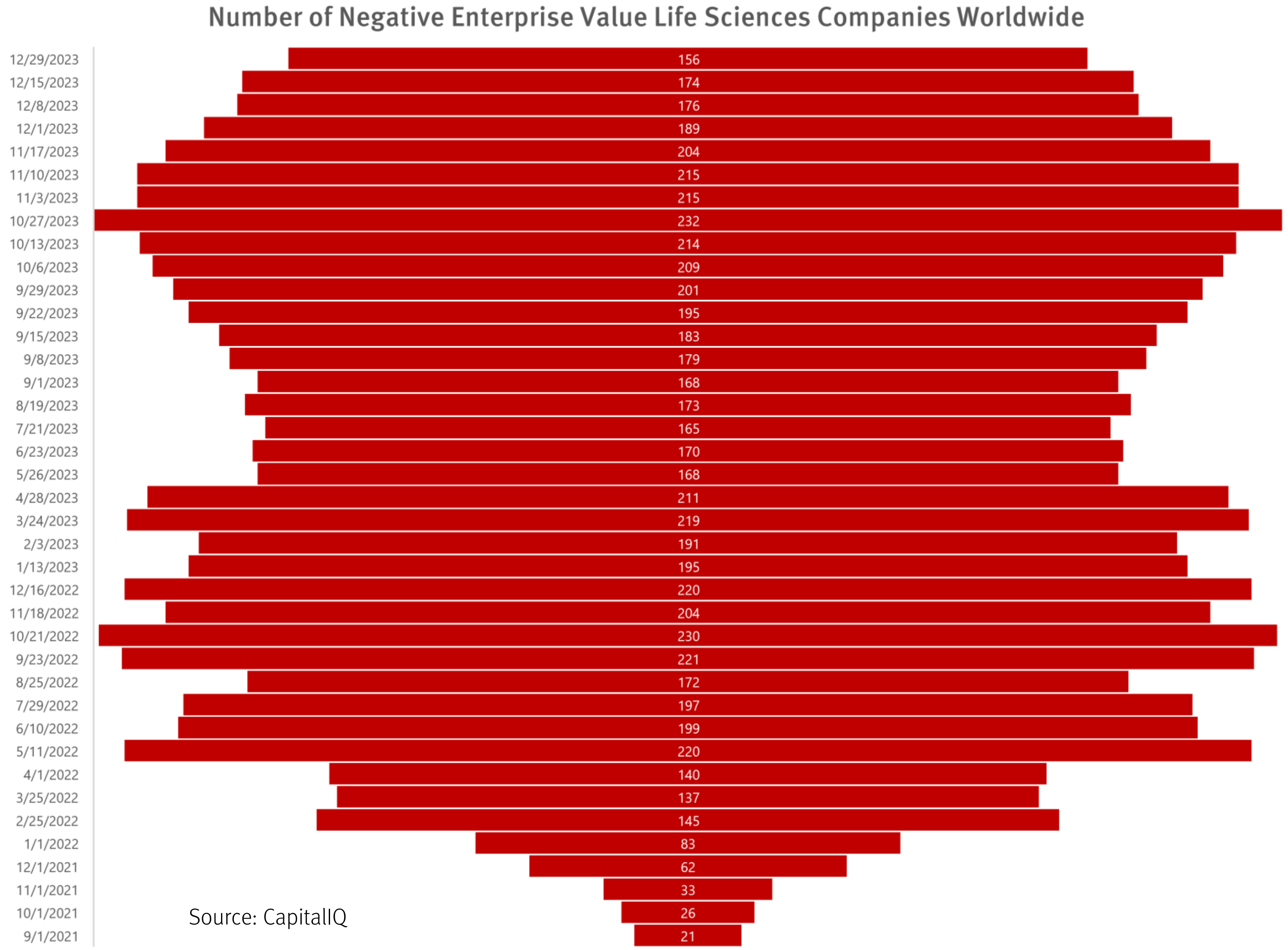
Public Biotech Company Count Shrunk Only 3% in 2023

Number of Publicly Traded Biotech Companies Worldwide, May 2022 to Dec 2023



Source: CapitalIQ. Biotechs are defined as any therapeutics company without an approved product on any global stock exchange.

Number of Negative Enterprise Value Life Sciences Companies Fell to 156 at Year End



Source: CapitalIQ

The count of negative EV life sciences companies worldwide fell from 220 at the start of the year to 156 by year end.

Even if the total number of biotechs didn't shrink that much, the number of companies where market participants seem to suggest a company is better off "dead than alive" dropped dramatically throughout 2023.

Life Sciences Sector Up 2.1% in 2023

Last year saw a 2.1% rise in life sciences stocks worldwide. The sector's value rose by $193 billion. Biotech and diagnostics did the best. The CDMO and HCIT subsectors were down double digits for the year.

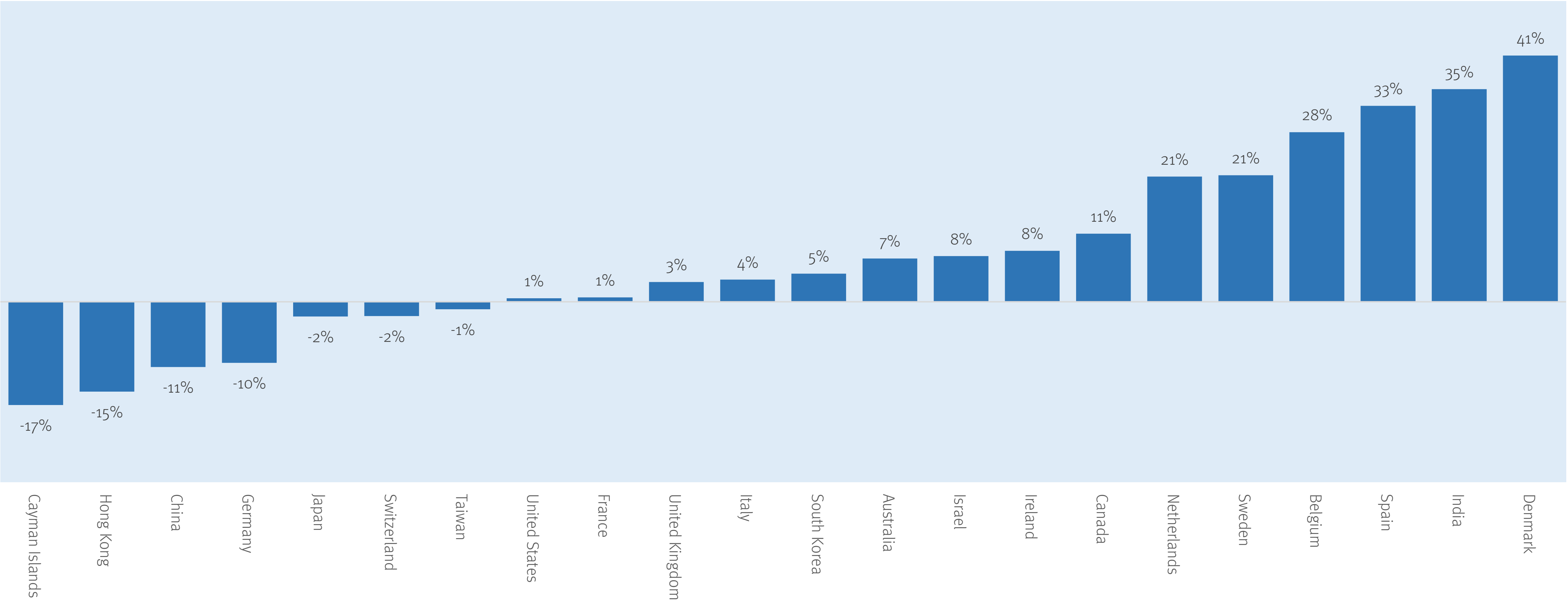
Sector	Firm Count	Enterprise Value (Dec 29, 2023, $mm)	Change in Last Week (percent)	Change in Last Month (percent)	Change in Last Year (percent)
API	81	$86,942	2.9%	1.0%	5.6%
Biotech	807	$233,384	5.2%	27.4%	15.7%
CDMO	40	$145,869	4.5%	-2.1%	-21.0%
Diagnostics	83	$280,760	0.7%	8.9%	12.9%
OTC	30	$28,281	0.6%	2.8%	-3.9%
Commercial Pharma	724	$5,920,292	1.5%	3.5%	2.3%
Pharma Services	39	$205,598	0.6%	1.5%	4.6%
Life Science Tools	51	$683,880	0.2%	8.0%	-9.3%
Medical Devices	181	$1,637,835	1.0%	6.0%	5.1%
HCIT	11	$22,823	3.3%	9.1%	-17.7%
Total	**2047**	**$9,248,963**	**1.4%**	**4.8%**	**2.1%**

Source: CapitalIQ and Stifel analysis.

Life Sciences Country Performance During 2023

China and Germany life sciences stocks declined in 2023. Japan, Switzerland, Taiwan, the US, the UK, Italy, France and South Korea were relatively flat. In contrast, Denmark, India, Spain and Belgium did well in 2023.

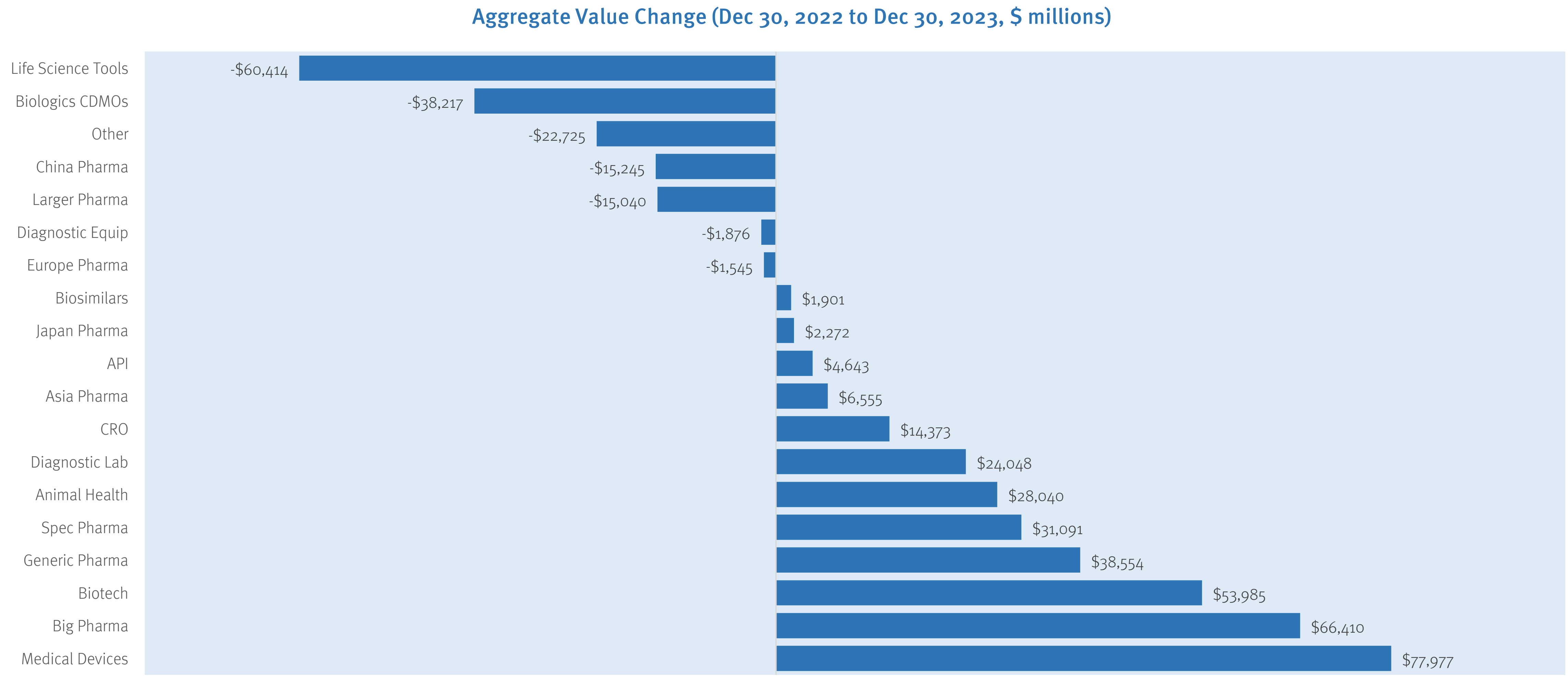
Percent Change in Aggregate Global Market Cap of Subsector of Life Sciences Industry, Dec 30, 2022 to Dec 29, 2023



Source: S&P CapitalIQ and Stifel analysis.

Life Sciences Subsector Performance During 2023

Medical devices, big pharma, biotech, generic pharma, spec pharma and animal health all did quite well. In contrast, life science tools and biologic CDMOs shed significant value during the year. Larger pharma and China pharma lost value during 2023.

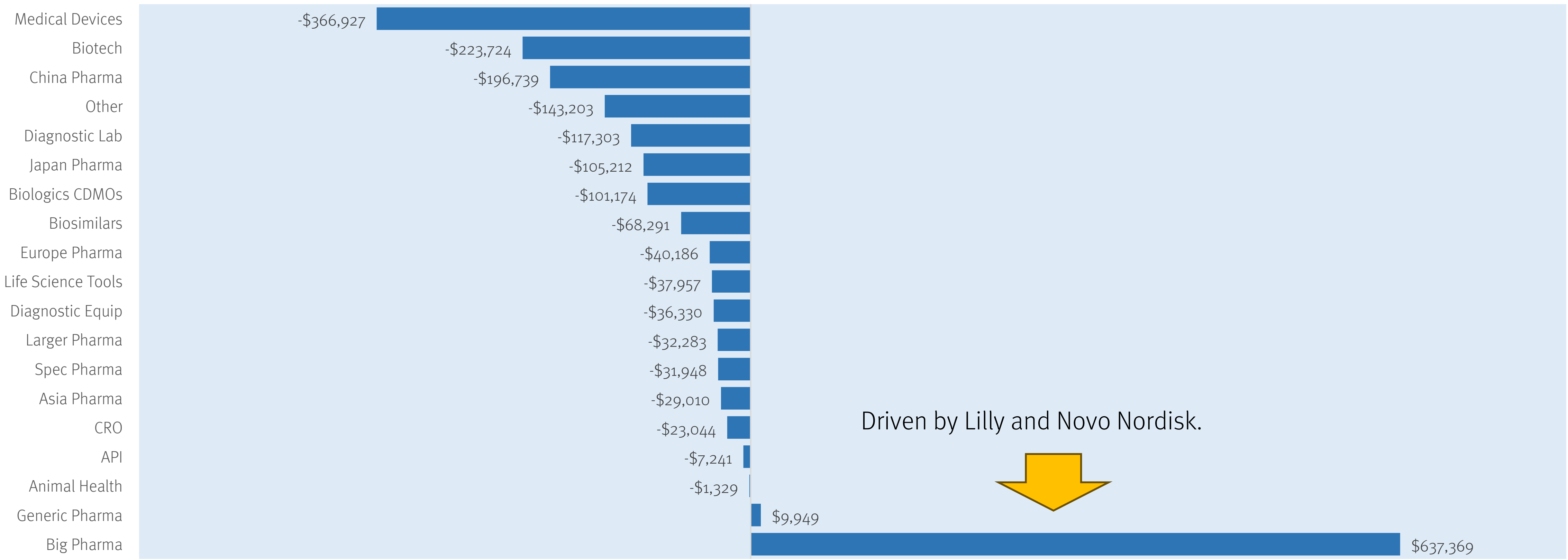


Source: S&P CapitalIQ and Stifel analysis.

Life Sciences Subsector Performance Since Pandemic Peak

This chart shows total change in subsector value since Feb 8, 2021 (the peak value date of the Pandemic). Since then, the life sciences sector shed $914 billion in value from its total of $10.2 billion at the time. The big story is big pharma. Specifically, Lilly and Novo. It seems hard to believe now, but on Feb 8, 2021 those companies were worth $362 billion. Today, in combination, they are worth exactly $1 trillion.* Their growth with obesity drugs has been overwhelmingly the success story of the life sciences sector of the last three years.

Aggregate Value Change (Feb 8, 2021 to Dec 30, 2023, $ millions)

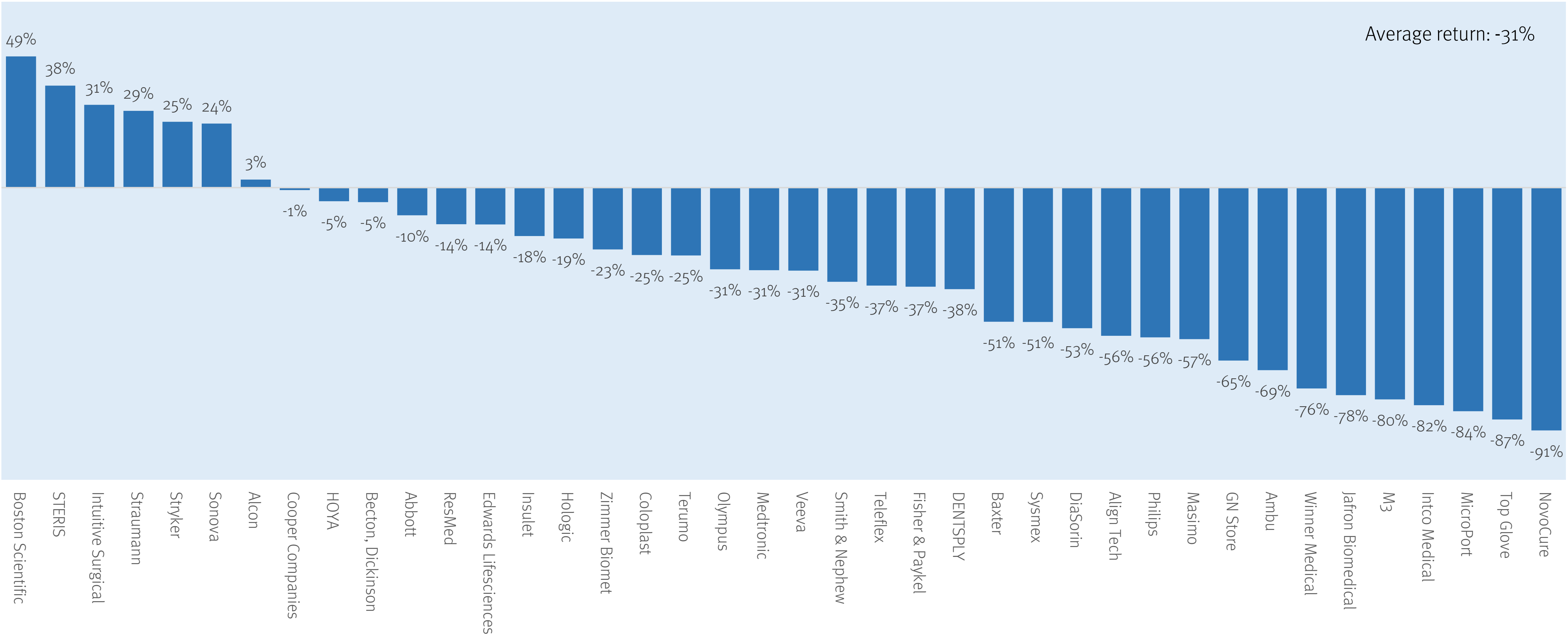


Source: S&P CapitalIQ and Stifel analysis. * The combined EV of Lilly and Novo on Dec 29, 2023 market close was $999.9 billion.

Medical Device Performance Since Pandemic Peak

The top ten medical device companies on Feb 8, 2021 shed 12% of their value through end of 2023. The next 30 were hit harder – down 31% in the same period. Stories like Jafron, Novocure and Microport were all hit very hard over the last three years.

Percent Change in Market Cap of Top 40 Players in Global Medical Devices, Feb 8, 2021 to Dec 30, 2023

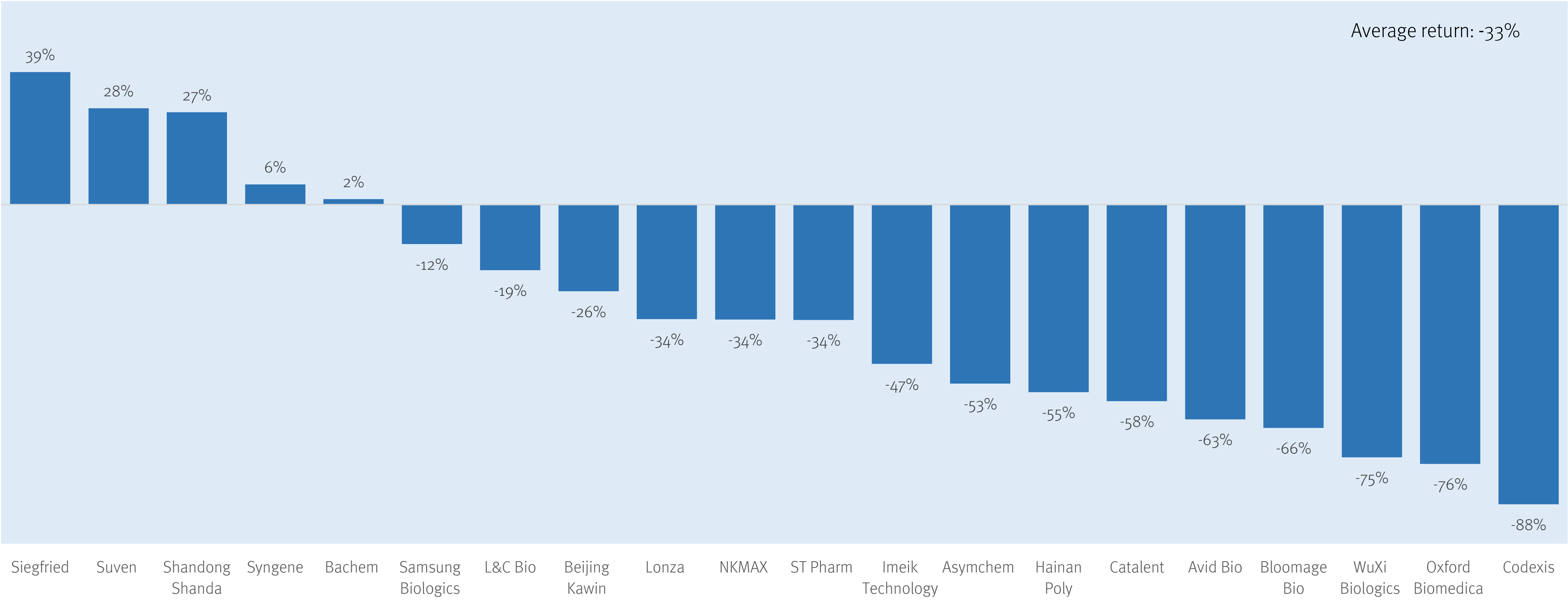


Source: S&P CapitalIQ and Stifel analysis.

CDMO Sector Performance Since Pandemic Peak

The Pandemic created an extreme need for outsourced manufacturing, particularly for Covid vaccines. Companies that have lost contracts or otherwise struggled on the business side have suffered. These players include Codexis, Oxford Biomedica, WuXi, Avid and Catalent. Some of the better performers are in the India market or on the small molecule rather than biologics side of the business.

Percent Change in Market Cap of Top 20 Global Public Players in CDMO Sector, Feb 8, 2021 to Dec 30, 2023



Source: S&P CapitalIQ and Stifel analysis.

Top 50 Life Science Companies that Have Risen / Dropped the Most in EV Rank Since the Pandemic Peak

Companies like Sun Pharma, Dexcom, Vertex, Regeneron and Alcon have done really well since the end of the Pandemic. Alibaba Health, M3, Wuxi Biologics and Illumina have all seen extreme declines in value rankings since then.

Biggest Gainers in EV Ranking, Feb 8, 2021 to Dec 30, 2023

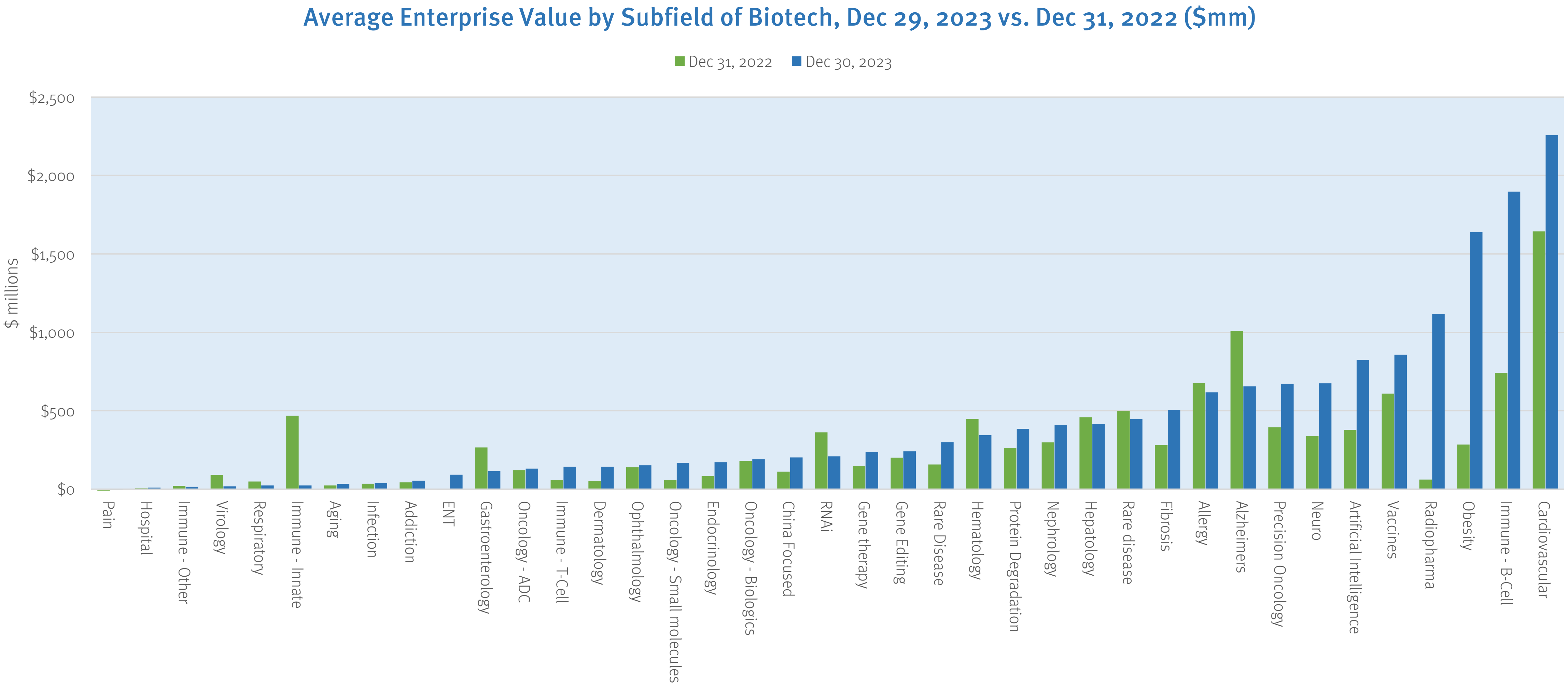
Company	Change in Value Rank
Sun Pharmaceutical	50
Dexcom	26
Agilent	18
Vertex Pharmaceuticals	17
Regeneron Pharmaceuticals	17
IDEXX Laboratories	17
Alcon	17
Viatris	15
Boston Scientific	11
IQVIA	11
Novo Nordisk	10
Zimmer Biomet	10
Teva Pharmaceutical	10
Eli Lilly	8
AstraZeneca	8

Biggest Decliners in EV Ranking, Feb 8, 2021 to Dec 30, 2023

Company	Change in Value Rank
Alibaba Health	-140
M3	-85
WuXi Biologics	-54
Illumina	-36
Zhifei Biological	-32
Align Technology	-31
Moderna	-29
WuXi AppTec	-20
Hengrui Medicine	-18
Philips NV	-13
Bayer	-8
Pfizer	-7
Veeva Systems	-7
GlaxoSmithKline	-6
Takeda Pharmaceutical	-6

Biotech Values Today Highest in Cardio, Obesity and B-Cell

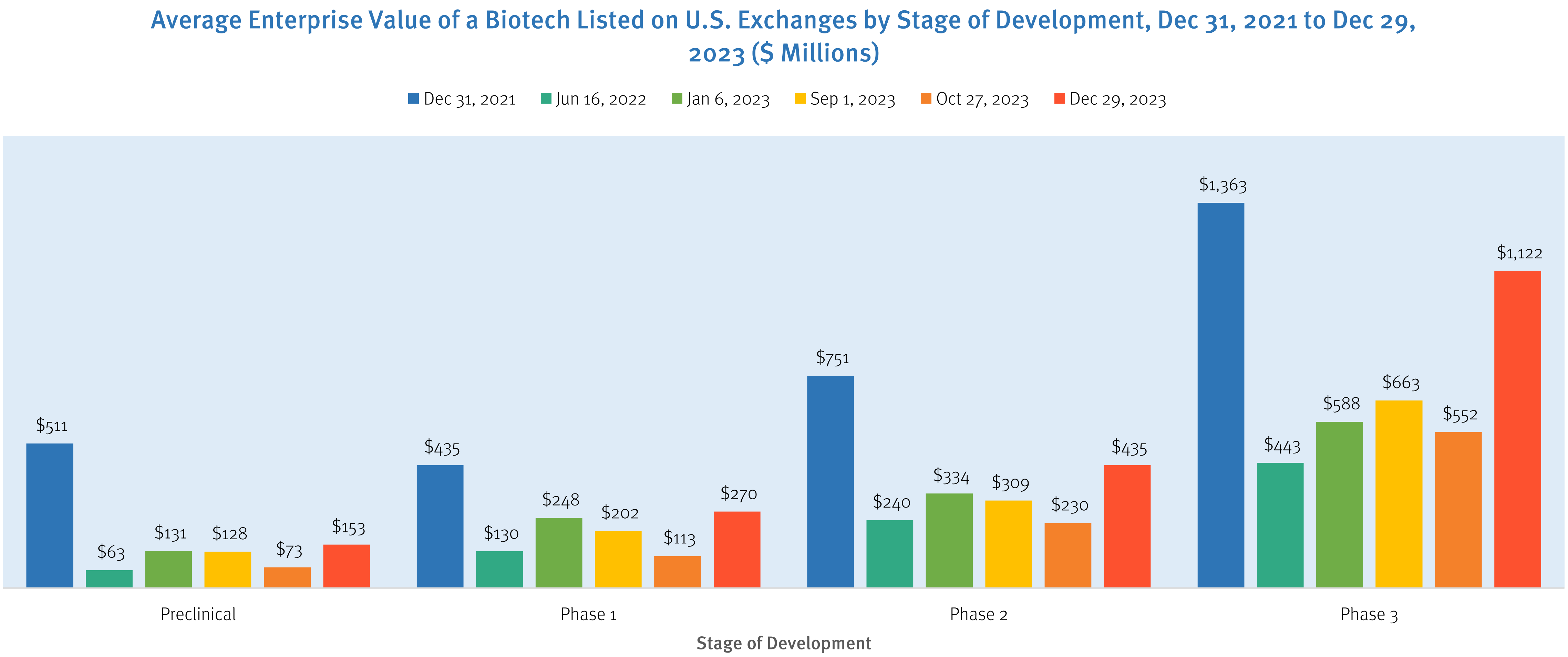
The most valued sectors in biotech today are in cardiometabolic disease, B-cell immunology, obesity, radiopharma, vaccines, AI and neuroscience. We have seen substantial values drop in Alzheimers, fibrosis, RNAi and innate immunology.



Source: S&P CapitalIQ and Stifel analysis.

Late-Stage Company Values Close to Pandemic Levels

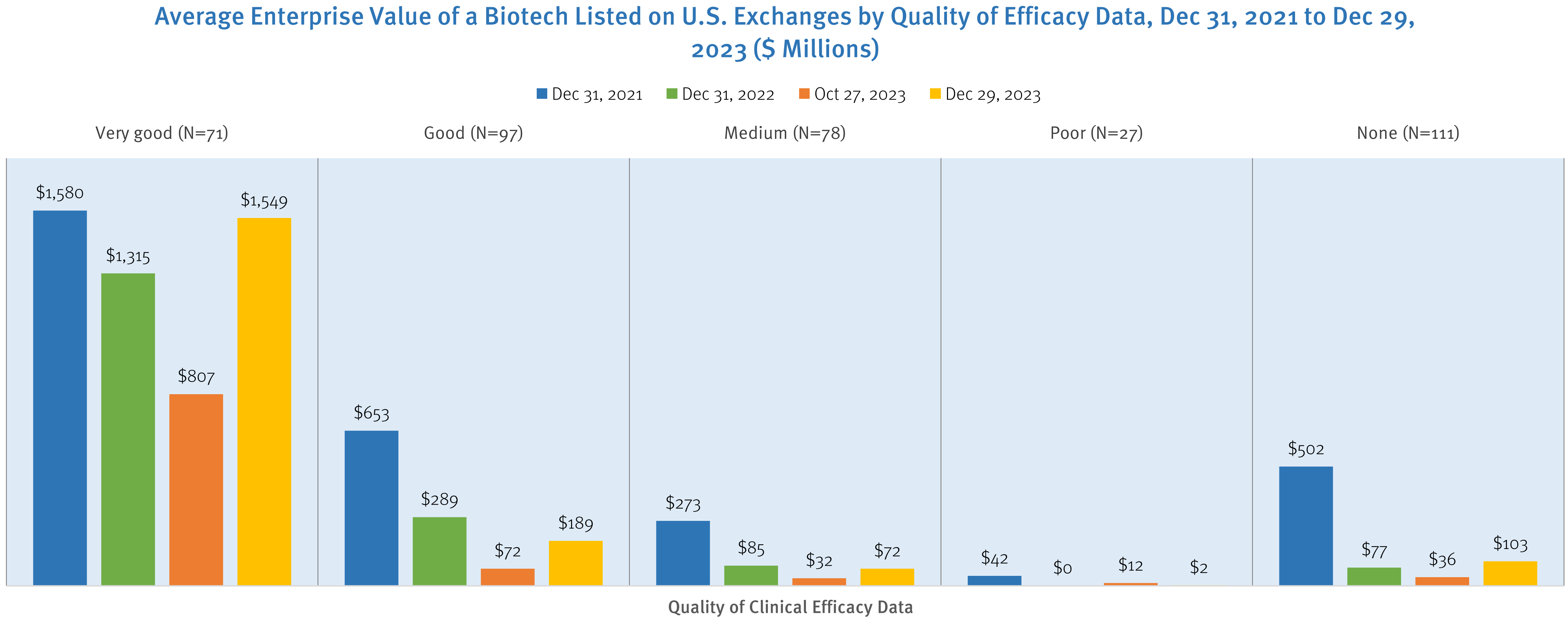
The average value of a Phase 3 biotech today is $1.1 billion. This compares to $1.36 billion two years ago. In contrast, the average preclinical company value today of $153 million is way down from its value of $511 million two years ago. The downturn has tilted the market towards later stage stories.



Source: CapitalIQ and Stifel analysis. Phase of development is defined by release of at least some efficacy data from a given stage of clinical development.

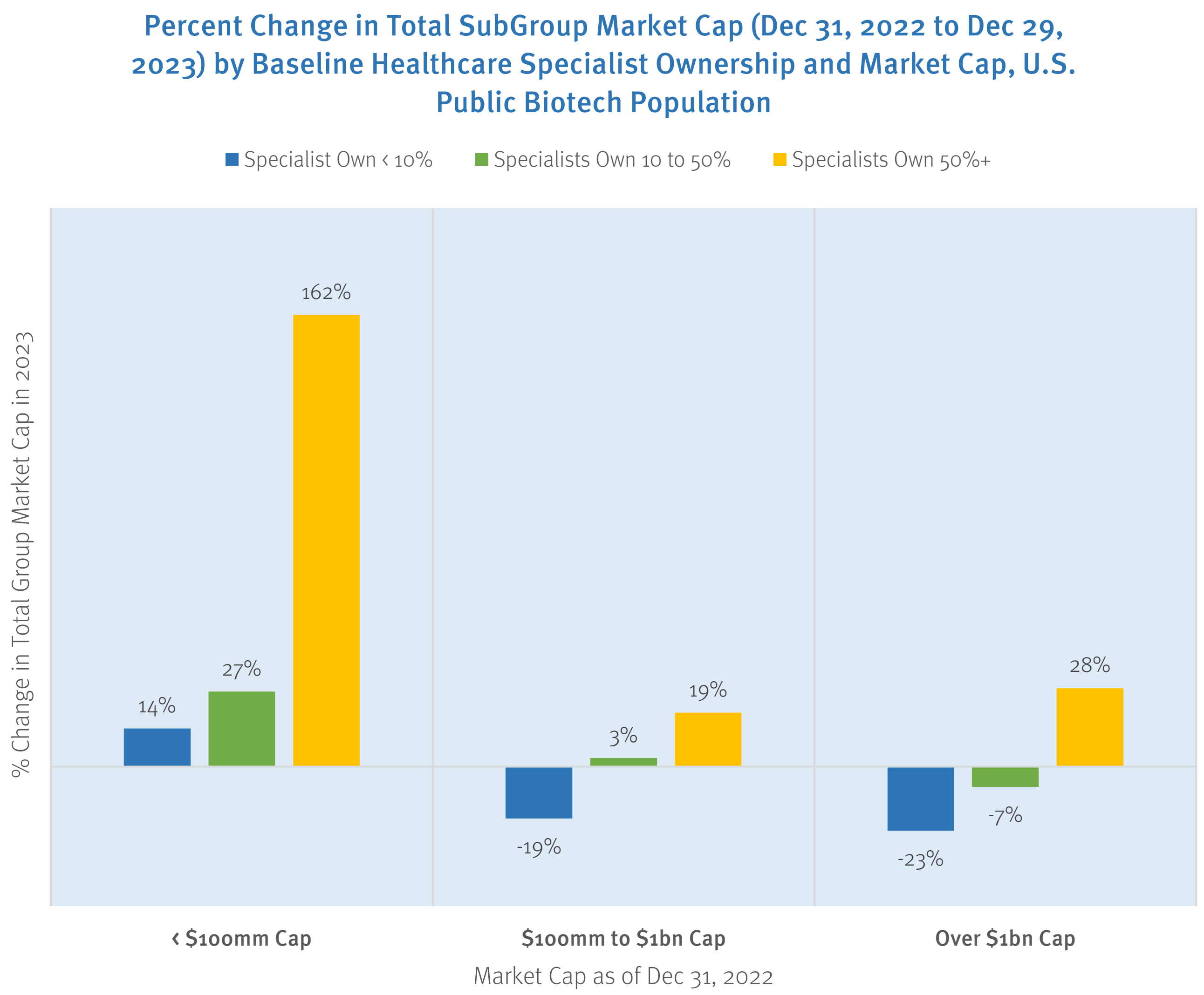
Strong Recovery in Quality Premium in Last Ten Weeks

One of the distinctive characteristics of the biotech downturn of 2022 to 2023 has been an extreme quality premium. Companies with "very good" data have traded at a value of five to ten times companies with a "good" dataset. We have seen a strong recovery in value of companies with very good or good data and no recovery in value for those with poor data. The biggest jump since Oct 27 has been in the shares of companies that have no data yet.



Source: CapitalIQ and Stifel analysis.

Specialist Ownership Very Important in 2023



Previously, Peter Kolchinsky and Tess Cameron of RA Capital have argued that the world of biotech is bifurcated into companies that can attract healthcare specialist funds (giving them the ability to finance and operate) and other companies that are not able to attract such funds. Also, see next section for details on a recently released study return to this topic.

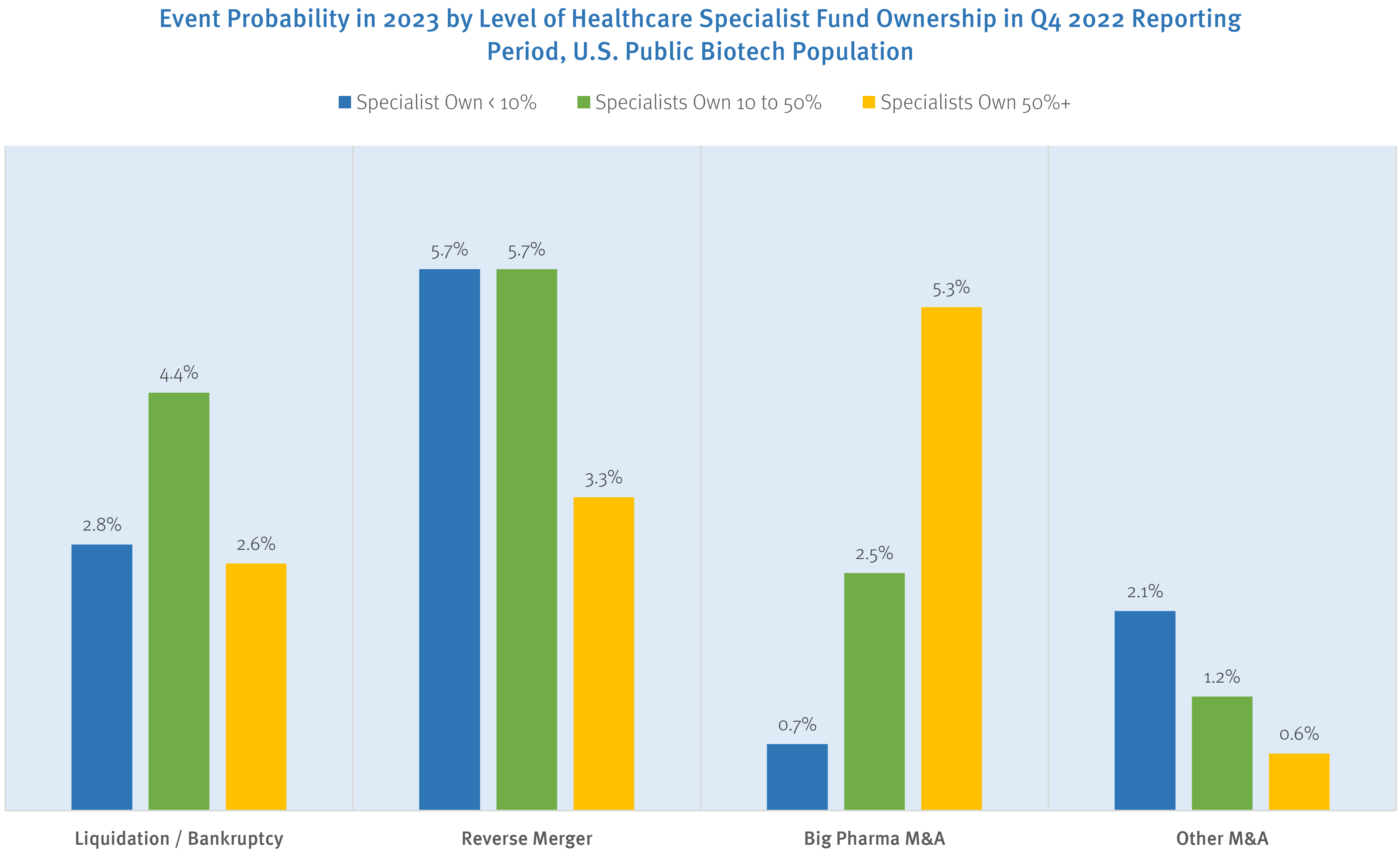
The chart divides the U.S.-listed biotech population into nine groups based on market cap at the start of 2023 and the level of healthcare specialist ownership going into 2023.

All groups where there was 50% or higher specialist ownership at the start of the year performed well. In contrast, while microcap companies (sub $100mm) did better with high specialist ownership, those with less or little ownership generated a positive return.

Interestingly, companies with more than a $100mm market cap at the start of 2023 that did not have high specialist ownership *lost substantial value.*

Source: CapitalIQ and Stifel analysis.

Specialist Ownership Associated with Good M&A Outcomes



This chart shows that the odds of a big pharma M&A deal were much higher in 2023 if there is 50% or higher healthcare specialist fund ownership of a biotech.

In contrast, the odds of a reverse merger or other type of M&A deal (perhaps a purchase by another biotech) were lower among companies with more than 50% healthcare specialist funds.

Source: CapitalIQ and Stifel analysis.

Healthcare Specialists and Condition of the Biotech Sector

Companies with higher healthcare specialist ownership at the start of 2023 were much more likely to end the year with a higher market cap. Two thirds of the U.S. biotech sector had at least 10% specialist ownership at the start of 2023. By the end of 2023, these companies had 94% of the total market cap of the sector.

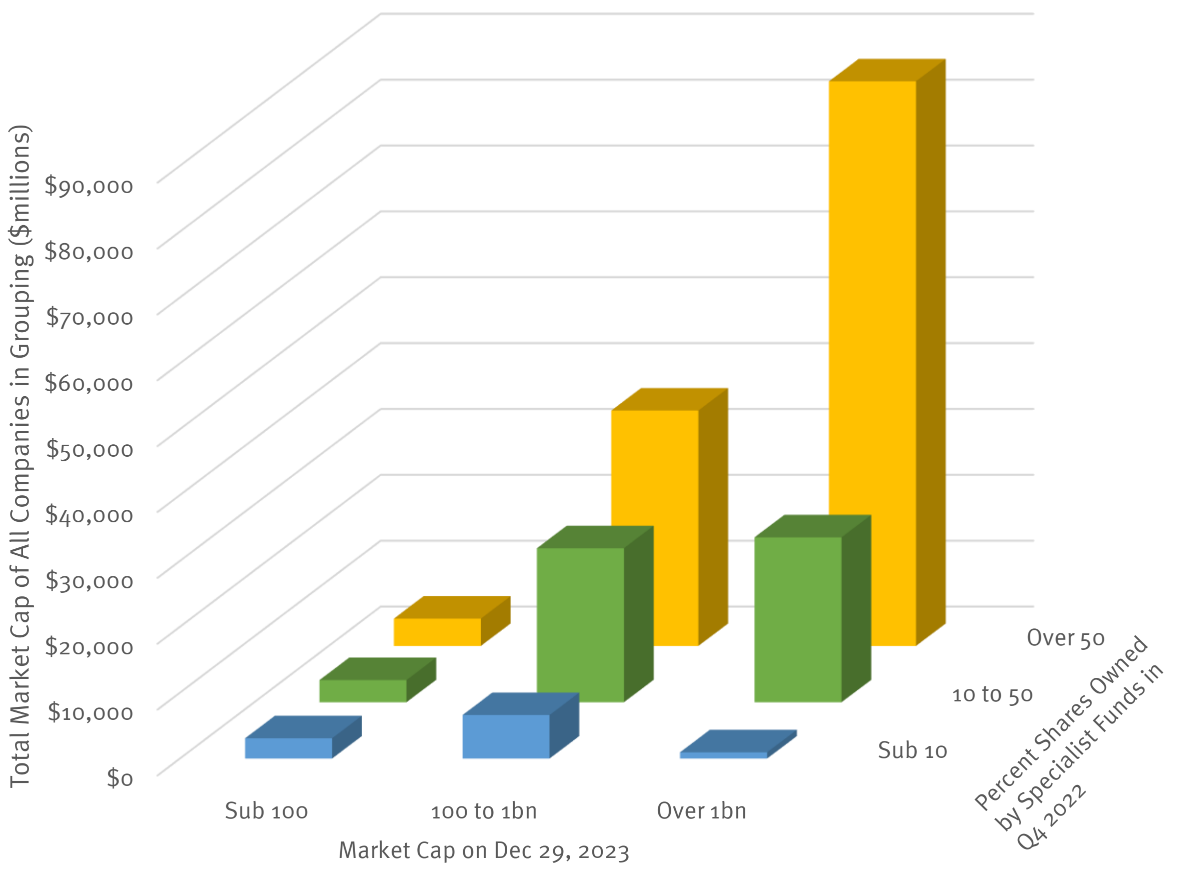
Distribution of US Public Biotech Universe at Start of 2023 (N=444)

Market Cap at Start of 2023	Healthcare Specialist Ownership in Q4 2022: Under 10%	10% to 50%	Over 50%
Over $1 Billion	1 (0.2%)	11 (2%)	31 (7%)
$100mm to $1bn	30 (7%)	58 (13%)	67 (15%)
Under $100mm	105 (24%)	105 (24%)	36 (8%)
Grand Total	140 (33.6%)	138 (33%)	139 (33.3%)

Distribution of US Public Biotech Universe at End of 2023 (N=417)

Market Cap at End of 2023	Healthcare Specialist Ownership in Q4 2022: Under 10%	10% to 50%	Over 50%
Over $1 Billion	2 (0.5%)	15 (4%)	37 (9%)
$100mm to $1bn	33 (8%)	56 (13%)	69 (16%)
Under $100mm	105 (25%)	67 (16%)	33 (8%)
Grand Total	140 (33.6%)	138 (33%)	139 (33.3%)

Distribution of Sector Market Cap on Dec 30, 2023 by Level of Specialty Investor Sponsorship in Q4 2022



Source: CapitalIQ and Stifel analysis. Biotechs are defined as companies that do not have an approved product. New entrants in 2023 were not included in this analysis, hence the visible drop in company count in the two tables.

Healthcare Specialists and Balance Sheet Condition of Biotech

Percent of Biotech Universe with a Viable Balance Sheet at Start of 2023

	Healthcare Specialist Ownership in Q4 2022		
Market Cap at Start of 2023	Under 10%	10% to 50%	Over 50%
Over $1 Billion	1 (100%)	11 (100%)	31 (100%)
$100mm to $1bn	27 (90%)	67 (88%)	67 (100%)
Under $100mm	54 (51%)	54 (83%)	31 (86%)
Grand Total	82 / 140 (59%)	132 / 138 (96%)	129 / 139 (93%)

Percent of Biotech Universe with a Viable Balance Sheet at End of 2023

	Healthcare Specialist Ownership in Q4 2022		
Market Cap at End of 2023	Under 10%	10% to 50%	Over 50%
Over $1 Billion	2 (100%)	15 (100%)	37 (100%)
$100mm to $1bn	19 (58%)	46 (82%)	62 (90%)
Under $100mm	16 (15%)	29 (43%)	19 (58%)
Grand Total	37 / 140 (26%)	90 / 138 (63%)	128 / 139 (92%)

Source: CapitalIQ and Stifel analysis.

We define a minimally viable biotech balance sheet as one that includes net cash of at least one year of burn or $100mm or more in net cash. If a company had less than $10mm in net cash (no matter what) we defined it as not having a viable balance sheet. This is a relatively low bar and an admittedly completely arbitrary definition.

The tables at left show the number (and percent) of companies with a minimally viable balance sheet by specialist investor ownership in Q4 2022 and market cap group.

The story is a stark one.

The percent of companies with less than 10% specialist ownership and a minimally viable balance sheet at the start of 2023 was 59%. These companies were able to finance in the Pandemic boom period. However, by year end, the percent of companies in this group with a minimally viable balance sheet had fallen to 26%. These companies burned through capital in 2023 and were not able to replace the burn.

In contrast, the percent of companies with more than 50% specialist ownership that had a minimally viable balance sheet at the start of the year was 93%. By the end of the year, the percent had dropped to 92%.

These companies were able to access capital in 2023 and keep their projects financed.

It may be harsh but, in a way, the biotech financing system is working. Companies that can convince a significant number of specialists to own their stock were able to finance through a very tough downturn year.

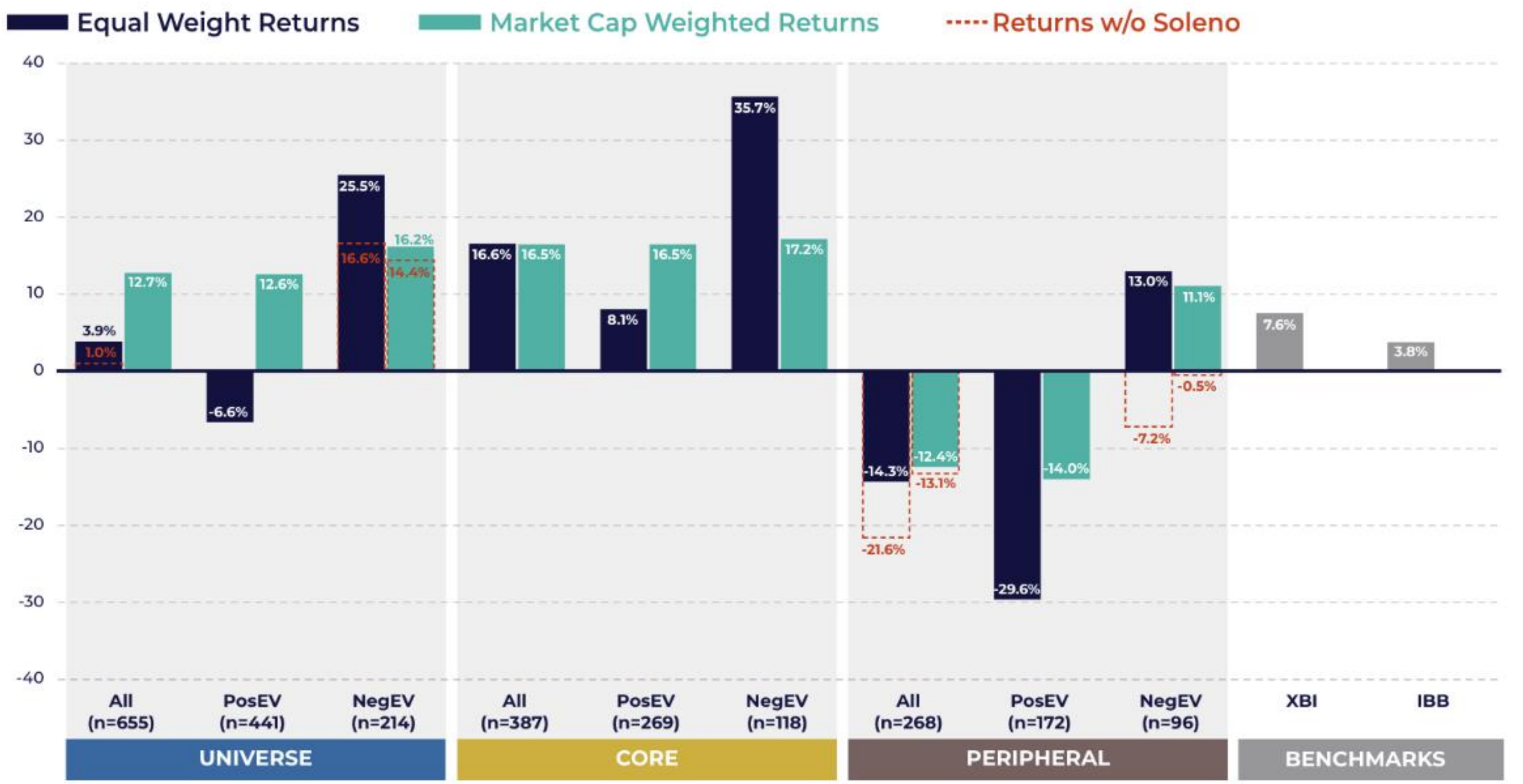
In contrast, companies that had high retail, generalist and index ownership struggled to finance in 2023 as many of those types of investors exited the market.

RA Capital Report on the Market – Jan 4, 2023

A year ago we published the first "Semper Maior" piece, making the case that biotech was on firm ground and ready for a reboot. We put out the second piece last summer, when it felt like the rebound was underway. Had the year ended in October or even November… well, you know. But here we are after a general market and XBI surge feeling like biotech is now truly recovering from its prolonged downturn, having been distilled to a more valuable core. So let's mine the data, as we have before, to get a sense of what happened in 2023 and what lessons to take with us into 2024.

Read the report: https://rapport.bio/all-stories/semper-maior-spirits-rising-january-2024

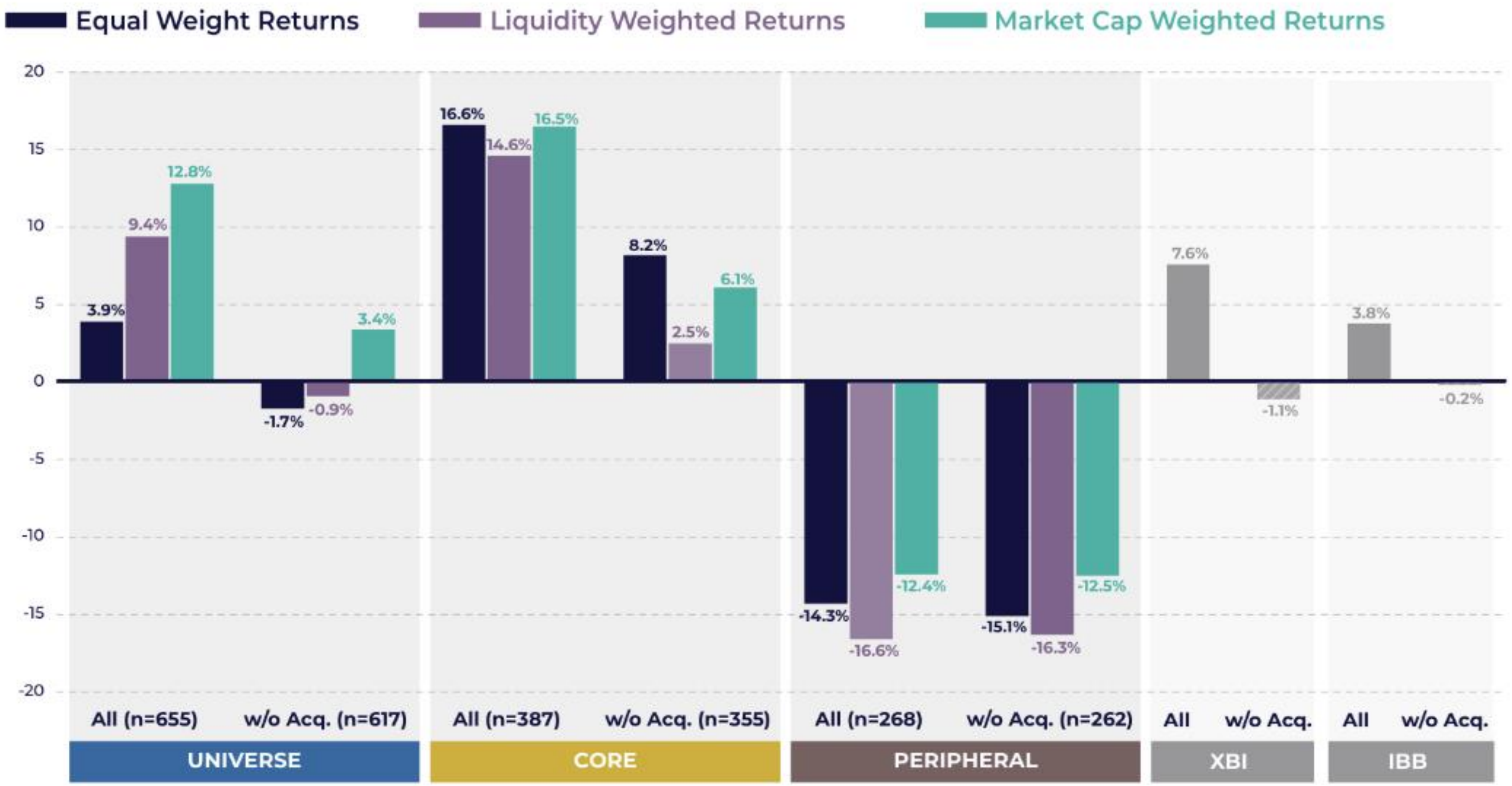
NegEV OUTPERFORMANCE: NICE RETURNS IF YOU CAN GET THEM



Universe, Core, and Peripheral are now split into companies that started 2023 with a positive enterprise value (PosEV) or negative EV (NegEV). What we see is that NegEV held up pretty well and arguably outperformed, especially if you have a small portfolio and can buy stakes in NegEV companies that are meaningful to you, which larger investors can't since the whole NegEV class makes up only 3.7% of the Universe by market cap (Table 1). Because Soleno was a component

This chart is quite interesting, showing that negative EV companies did quite well in 2023. This was particularly true for companies with healthcare specialist ownership (so-called "Core" companies).

FIGURE 5:
ACQUISITIONS DROVE RETURNS IN THE CORE AND ETFs



When you remove acquisitions from the Universe set (almost all of which were actually within the Core sub-set), performance over 2023 is notably lower for the Universe and Core. 2023 clearly wasn't a strong year for the un-acquired (aka, the Left Behind). But it wasn't horrible, and that's better than it could have been. We estimated the 2023 return without acquisitions for XBI and IBB.

SOURCE: *Bloomberg, FactSet, RA Capital*

RA finds, like we do, that companies with high specialist ownership ("core" companies) had higher returns in 2023.

What is most interesting is that companies without such ownership ("peripheral" companies) had quite poor results.

There is a key insight – which is that if one decomposes an index like XBI into core and non-core parts, the "specialist sponsored" biotech universe was largely in good shape in the markets in 2023.

SPECIALISTS ARE IN LITTLE DANGER

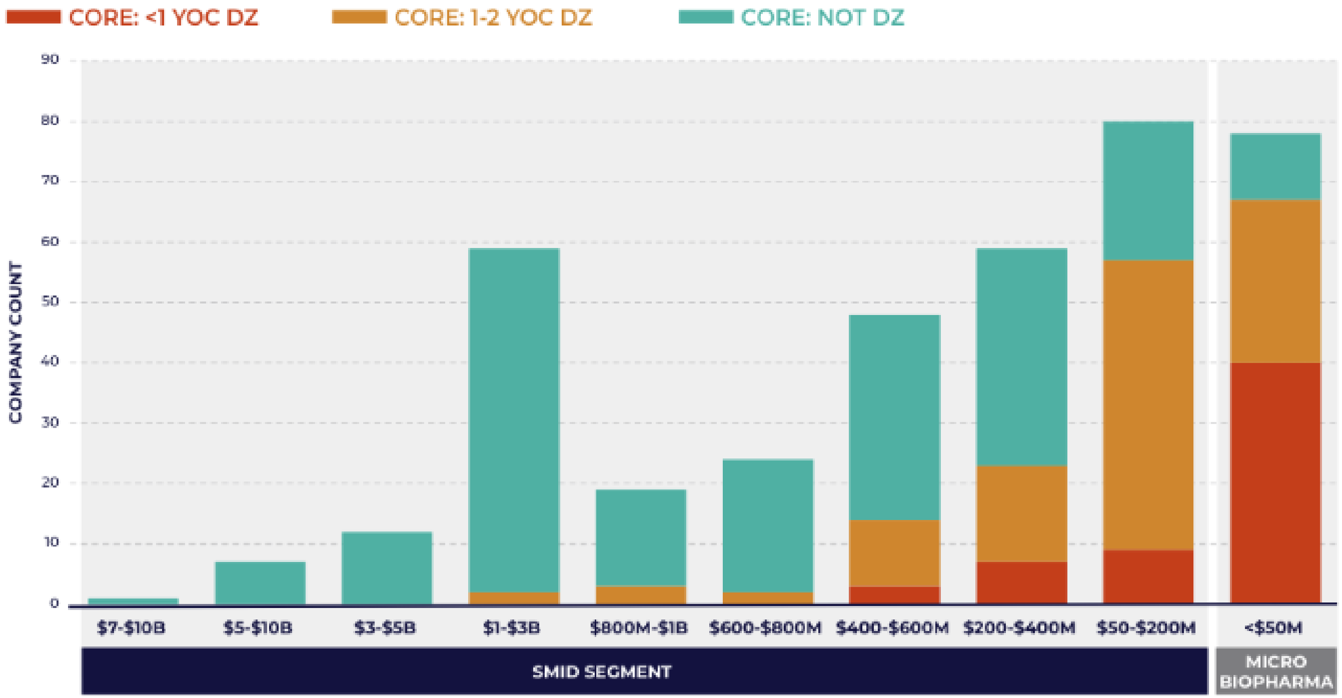
Whether we define the Danger Zone the old way or tighten it up, specialists have little exposure to these companies when we adjust for their market capitalizations.

FIGURE 9A shows the number of Core companies by market cap and colors the ones we classified as being in the Danger Zone. While both red and orange meet the old criteria for being in the Danger Zone (<2 YoC and >25% burn/MC ratio), only the red now meets the new criteria (<1 YoC and >25% burn/

FIGURE 9A:

SAFETY IN THE CORE:

FEW COMPANIES IN THE "NEW" DANGER ZONE



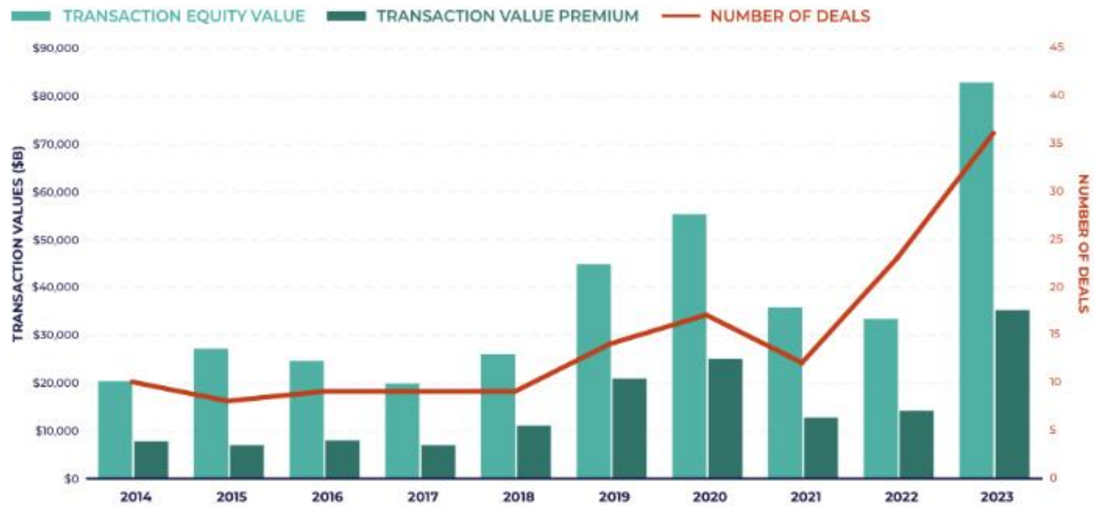
We show the number of companies in market cap segments in degree of "Danger" based on their YE23 valuations and 3Q23 financial statements. Note how there are far fewer companies in the "new" danger zone (<1YoC and >25% burn/MC ratio), mainly concentrated in micro caps.

SOURCE: *Bloomberg, FactSet, RA Capital*

Healthcare Specialists Sponsored Companies Garnered Substantial M&A Returns

FIGURE 10:

A RECORD YEAR FOR M&A IN THE DEVELOPMENT-STAGE BIOTECH UNIVERSE

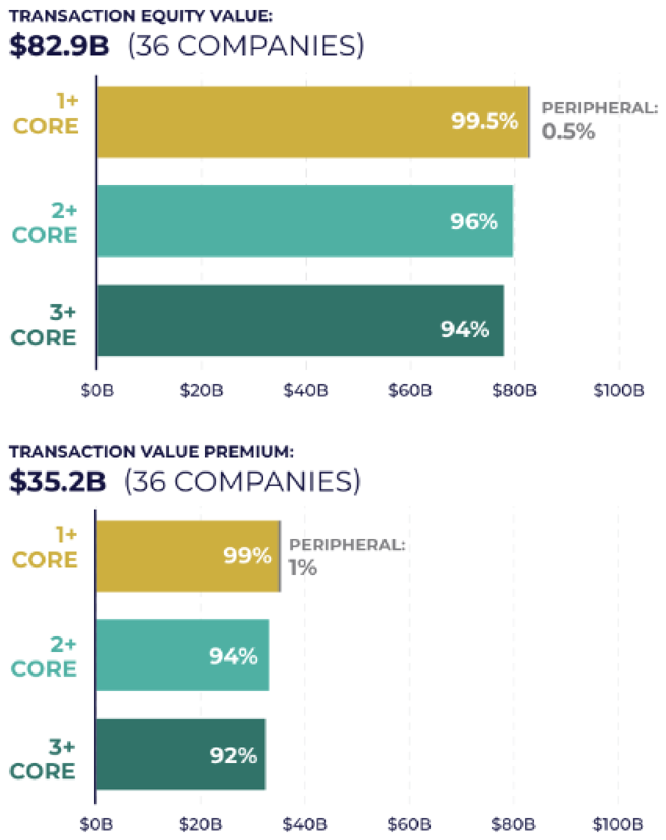


2023 was a record year for M&A within the biotech <$10B public development-stage Universe in terms of total deals, total M&A dollars to equity holders, and total M&A premium. We include acquisitions of companies in the Universe by year of announcement and calculate premiums based on the deal price vs. the average price in the 20 days before the deal was announced. For companies with CVRs, the acquisition premium is based on where the stock was trading immediately prior to close, which reflects the expected value of the CVR to investors.

SOURCE: *Bloomberg, FactSet, RA Capital*

FIGURE 11:

M&A DOLLARS AND PREMIUMS FLOWED TO THE CORE IN 2023



The More Specialists – The More the M&A Returns

TABLE 5:

HIGHER RETURNS FROM M&A FOR COMPANIES WITH MULTIPLE SPECIALISTS

	Number of Companies (as of YE22)	**Cumulative Market Cap** ($B, as of YE22)	**Share of 2023 M&A Premium** (% of total)	**Return** (using proportions from 2023 M&A)
ALL	**655**	**$324**	**$35B** (100%)	**10.9%**
≥ 1 CORE	**387** (59%)	**$282** (87%)	**$35B** (99.5%)	**12.4%**
≥ 2 CORE	**287** (44%)	**$246** (76%)	**$33B** (94%)	**13.5%**
≥ 3 CORE	**220** (34%)	**$204** (63%)	**$32B** (92%)	**15.8%**
1-2 CORE	**167** (25%)	**$78** (24%)	**$3B** (8%)	**3.5%**
PERIPHERAL	**268** (41%)	**$42** (13%)	**$0.2B** (0.5%)	**0.4%**

Return from M&A to the Universe, Peripheral, and Core as defined by number of specialist holders as of the time a deal was announced. Strategics rarely buy Peripheral companies and we see more of the returns accrue to Core but especially to companies that had more than two specialist holders.

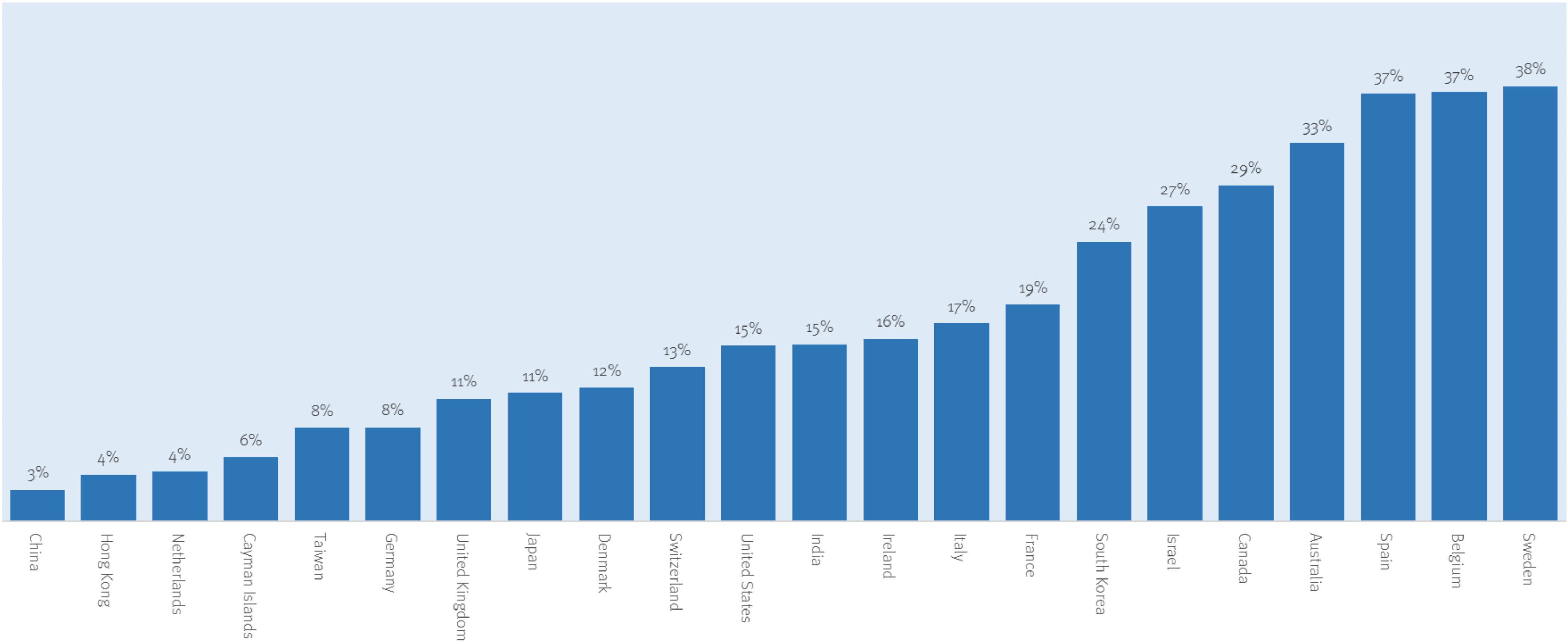
SOURCE: *Bloomberg, FactSet, RA Capital*

A Look at the Q4 Market Rally

In Which Country Has the Rally Been Strongest?

The life sciences rally has been particularly strong in Sweden, Belgium, Spain, Australia, Canada and Israel. China has not benefitted much due to economic issues in that country.

Percent Change in Aggregate Global Market Cap of Subsector of Life Sciences Industry, Oct 27 to Dec 29, 2023

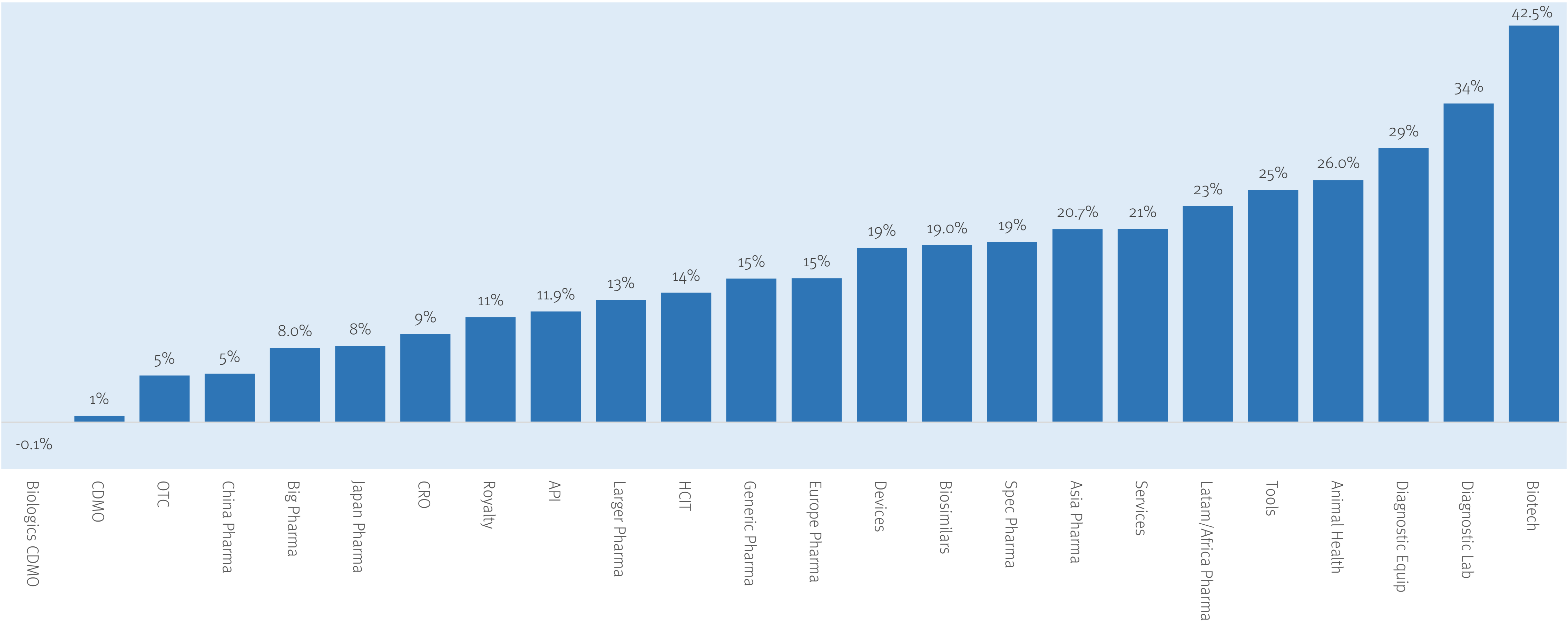


Source: S&P CapitalIQ and Stifel analysis.

In Which Segment Has the Rally Been Strongest?

The life sciences rally has been particularly strong for biotech, diagnostics, animal health and life science tools. The rally has been weakest in CDMO's and China.

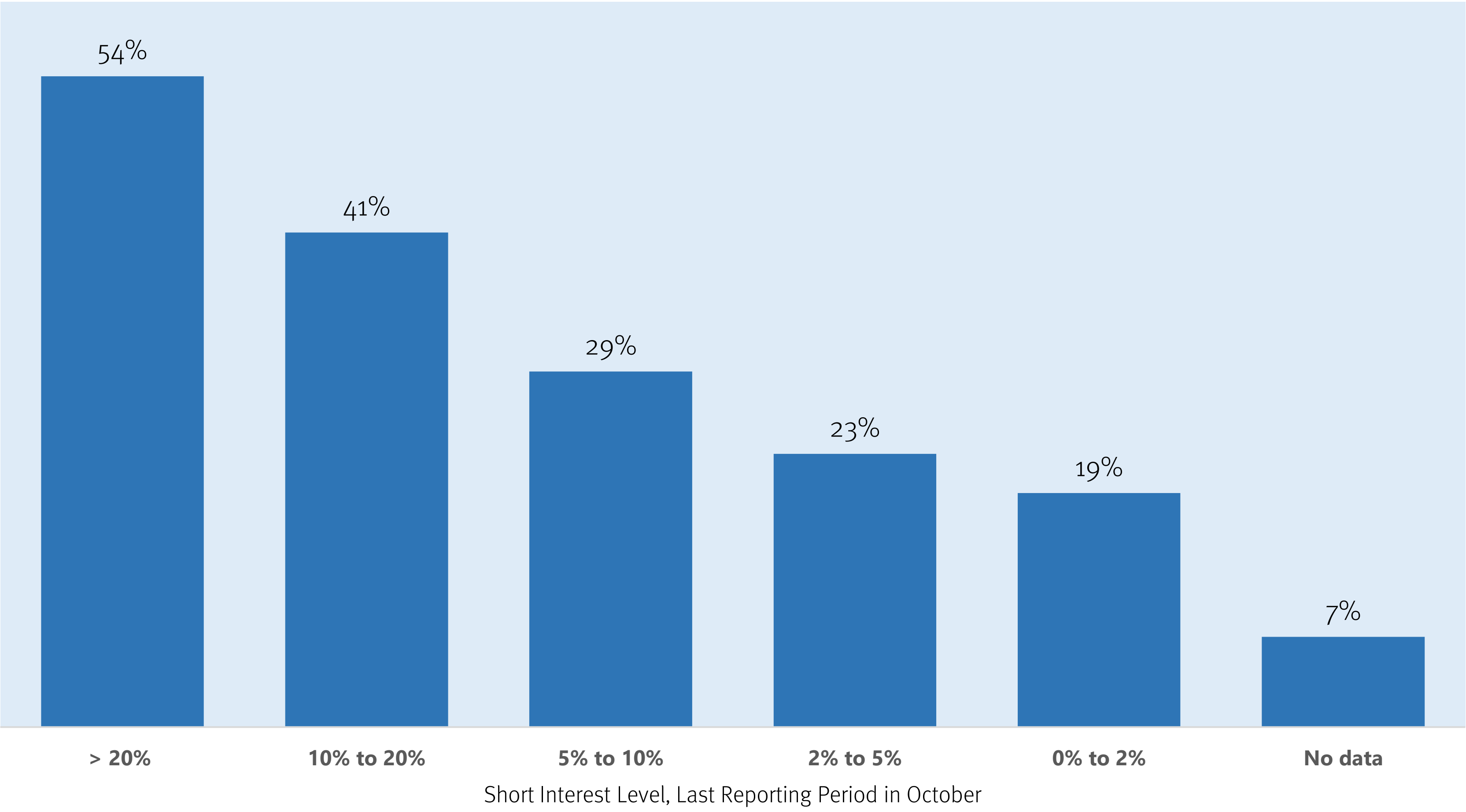
Percent Change in Aggregate Global Market Cap of Subsector of Life Sciences Industry, Oct 27, 2023 to Dec 29, 2023



Source: S&P CapitalIQ and Stifel analysis.

Highly Shorted Stocks Rallied Most in the Last Ten Weeks...

Percent of Stocks Up 50% or More in Last Ten Weeks by Short Category at Start of Period (Oct 27 to Dec 30, 2023, Global Life Sciences Sector)



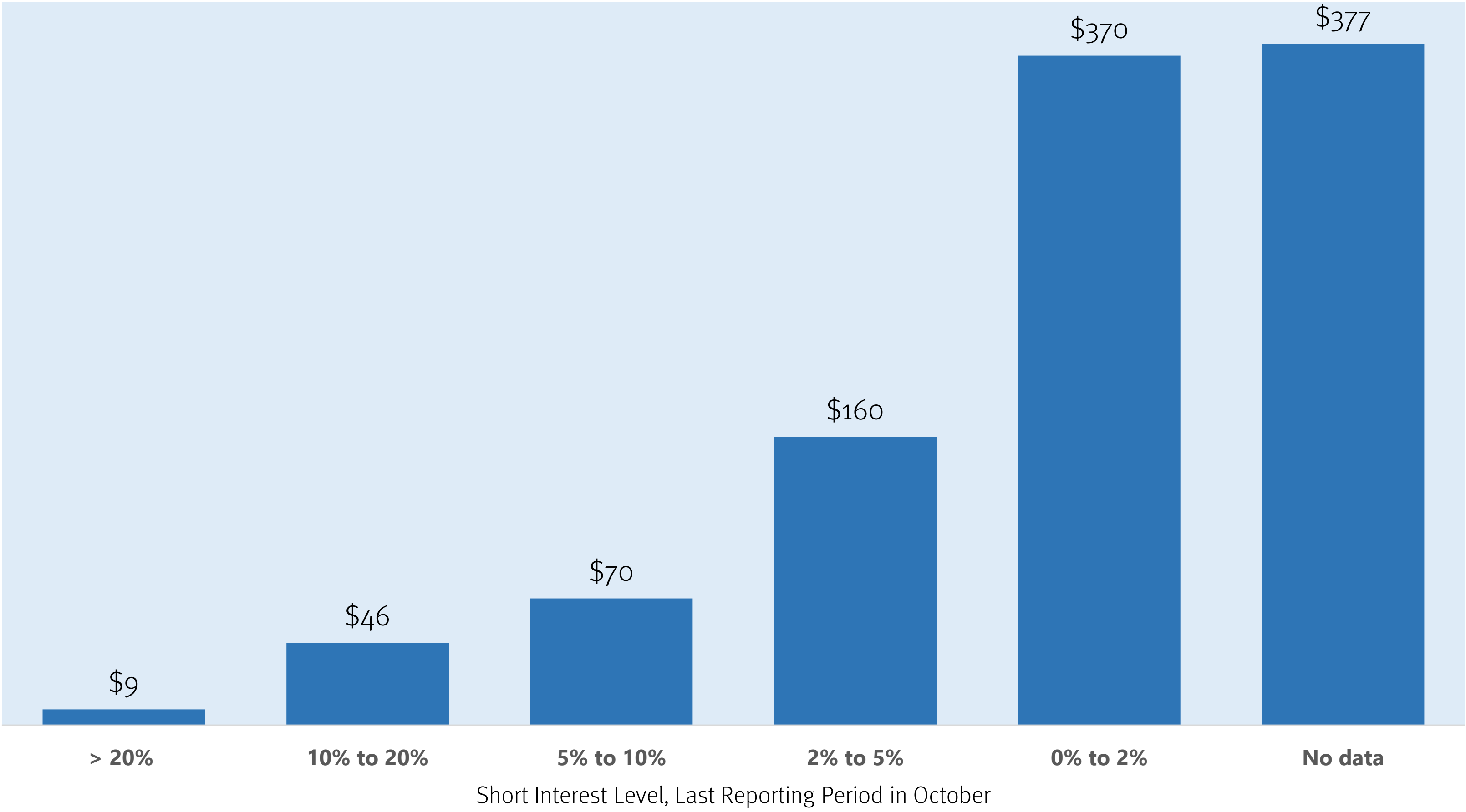
Fifty-four percent of companies that had short interest of 20% or more in late October have risen by 50% or more in the last ten weeks. In contrast, only 19% of stocks with less than 2% short interest rose 50% or more in the same period.

The rally appears to be linked, in part, to short covering.

Source: S&P CapitalIQ and Stifel analysis. Short interest is defined as number of shares short divided by total shares outstanding.

… But Short Covering Had Little to Do with the Rally Overall

Change in Market Cap of Global Life Sciences Sector in Last Ten Weeks by Amount of Short Interest in Late October 2023 ($ billions, Global Life Sciences Sector)



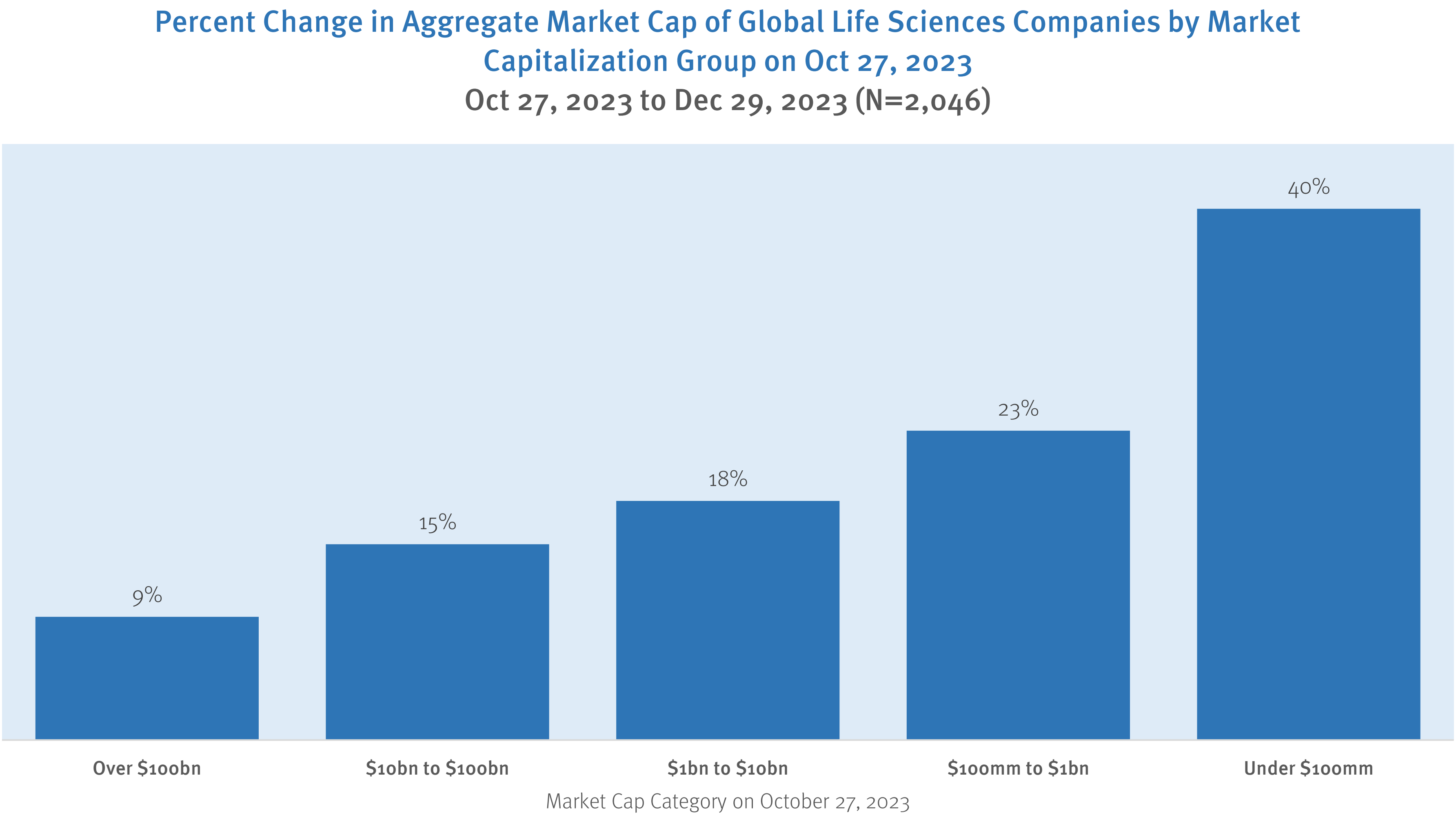
Even though returns have been much higher for highly shorted stocks in the last ten weeks, 90% of the value accretion in the life sciences sector has been for companies where there was less than 5% baseline short interest.

The reason is an obvious one. Short positions of 5% or more are relatively rare.

For this reason, one can say that overwhelmingly the recent rally has been a function of "real" buying rather than technically driven short covering.

Source: S&P CapitalIQ. Short interest is defined as number of shares short divided by total shares outstanding.

Small Caps Have Done Best in the Recent Rally



Traditionally, biopharma market rallies benefits large caps first, then mid caps and finally small caps last.

This rally has been the opposite.

We have seen the most beaten down group (micro caps) rally the most while large caps, on average, rallied by only 9% over the last ten weeks.

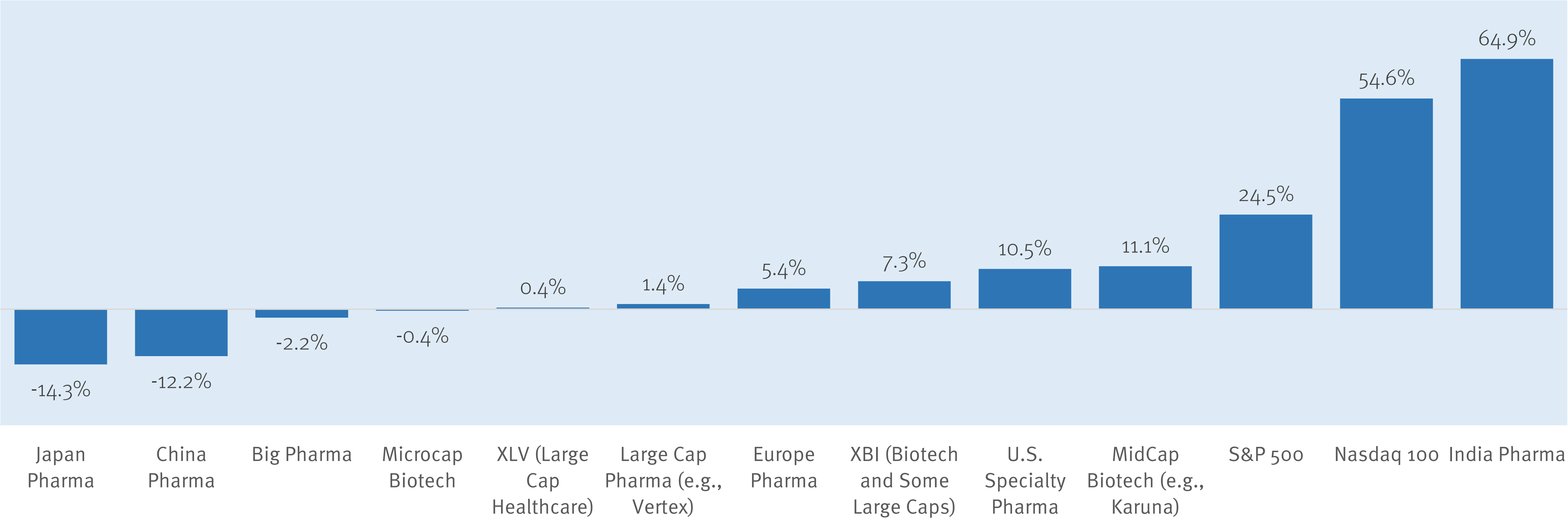
Source: CapitalIQ and Stifel analysis.

Global Pharma Update

Where Has the Market Done Best?

Both Japan and China pharma didn't do well in 2023. Big pharma was down slightly and large cap pharma (e.g., Vertex/Alnylam) was up barely. Microcap biotech cap was flat. In contrast, India pharma had an amazing year as did tech stocks (Nasdaq 100). U.S. specialty pharma, midcap biotech (heavy M&A here), the XBI and Europe pharma all performed better.

Group Equal-Weighted Share Price Return, Jan 1 to Dec 30, 2023

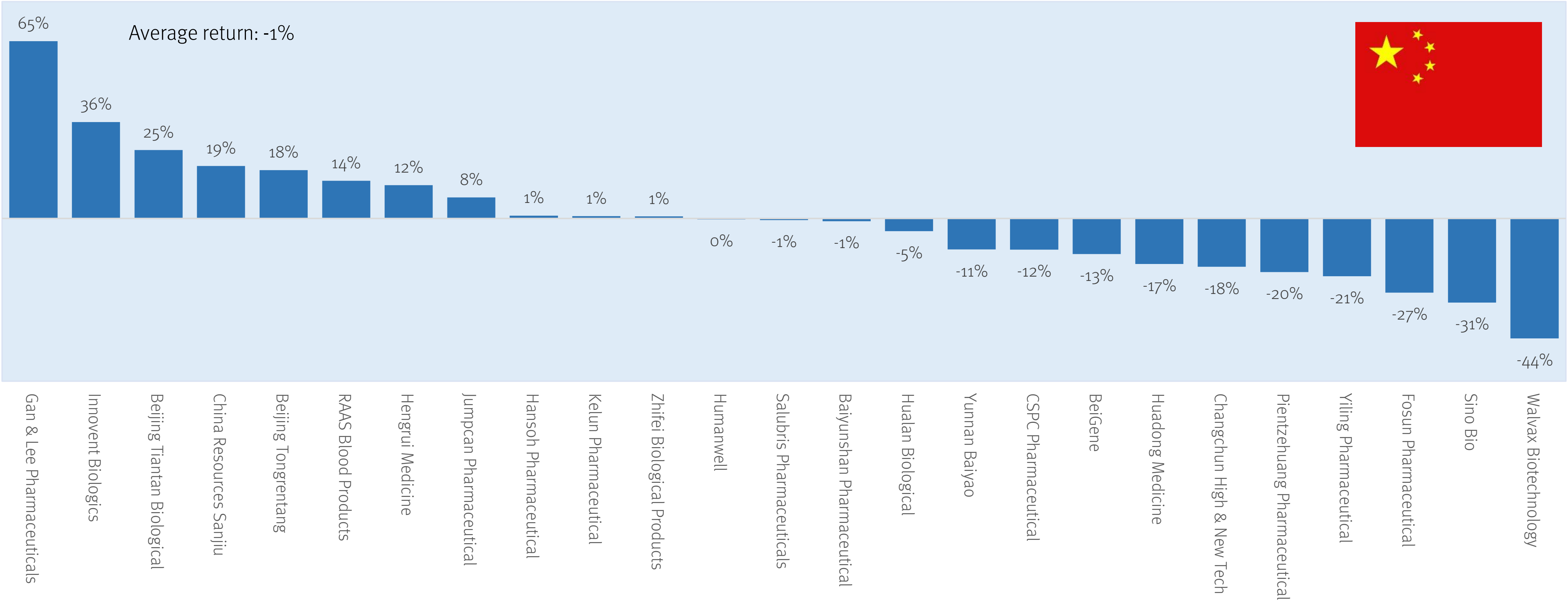


Notes: These data are from S&P CapitalIQ and are compiled into equal-weighted indices. Big pharma includes PFE, LLY, MRK, ABBV, NOVO B, ROG, JNJ, AMGN, AZN, NOVN and SAN. China Pharma includes 600276, 1093, 2186, BGNE, 000963, 600196, 000538, 600518, 002422, 000597, 3692 and ZLAB. India Pharma includes SUNPHARMA, 500257, AUROPHARMA, CIPLA, MANKIND, GLENMARK, 500124, ZYDUSLIFE. Europe Pharma includes Merck KGAA, IPN, HLUN A, BAYN, REC, SOBI, ALM, FRE, ORNBV, UCB, GRF. Japan Pharma includes Takeda, Daiichi-Sankyo, Chugai, Astellas, Eisai. Otsuka Holdings, Shionogi, Ono, Kyowa Kirin, Nippon Shinyaku, Santen and Sumitomo Pharma. Large / midcap biotech includes VRTX, ARGX, ALNY, BMRN, INCY, NBIX, OGN, IONS, EXEL, ALKS, ITCI, HRMY, INDV, BPMC, MRTX, SAGE, IDIA, APLS. US Small/midcap pharma includes SUPN, EGRX, CPRX, PCRX, IRWD, JAZZ, COLL, BHC, BLCO, ARQT, HLS, ASRT, OPTN, GTHX, ANIK, HROW, PHAT, ESPR, CALTX, AMARIN, OPK, LQDA, RIGL, EYPT, MRNS, ALIM, TRVN. LargeCap biotech includes KRTX, MDGL, CERE, CYTK, ARWR, PCVX, DNLI, VIR, CRSP, PRTA, BEAM, AKRO, IMVT, VRNA, VTYX, SWTX, SNDX and Microcap biotech includes LCTX, GLSI, GRPH, CYDY, OMER, SVRA, THRD, EVLO, TCRT, CMRX, TSHA, DTIL, OVID, TNYA, VXRT, CUE, XFOR, ATHA, TRVI, CTXR, SELB, CRMD, MTNB, AKBA.

China Pharma Down Slightly in 2023

The average return of a top 25 pharma in China was -1% in 2023. Gan & Lee delivered great results with its insulin products. Innovent had an amazing year with 30% oncology product growth in China combined with promising data for mazdutide, its obesity drug candidate. Walvax was hit by the downturn in Covid vaccines and Sino, Fosun, Yiling, Pientzehuang and Huadong all suffered due to adverse government pricing actions. Hengrui is the market cap leader in China and came back in 2023 by 12% after a very difficult time in 2021 and 2022. Hengrui shares remain down 50% from their peak in January 2022.

Percent Change in Market Cap of Top 25 Public Players in China Pharma, Jan 1 to Dec 30, 2023

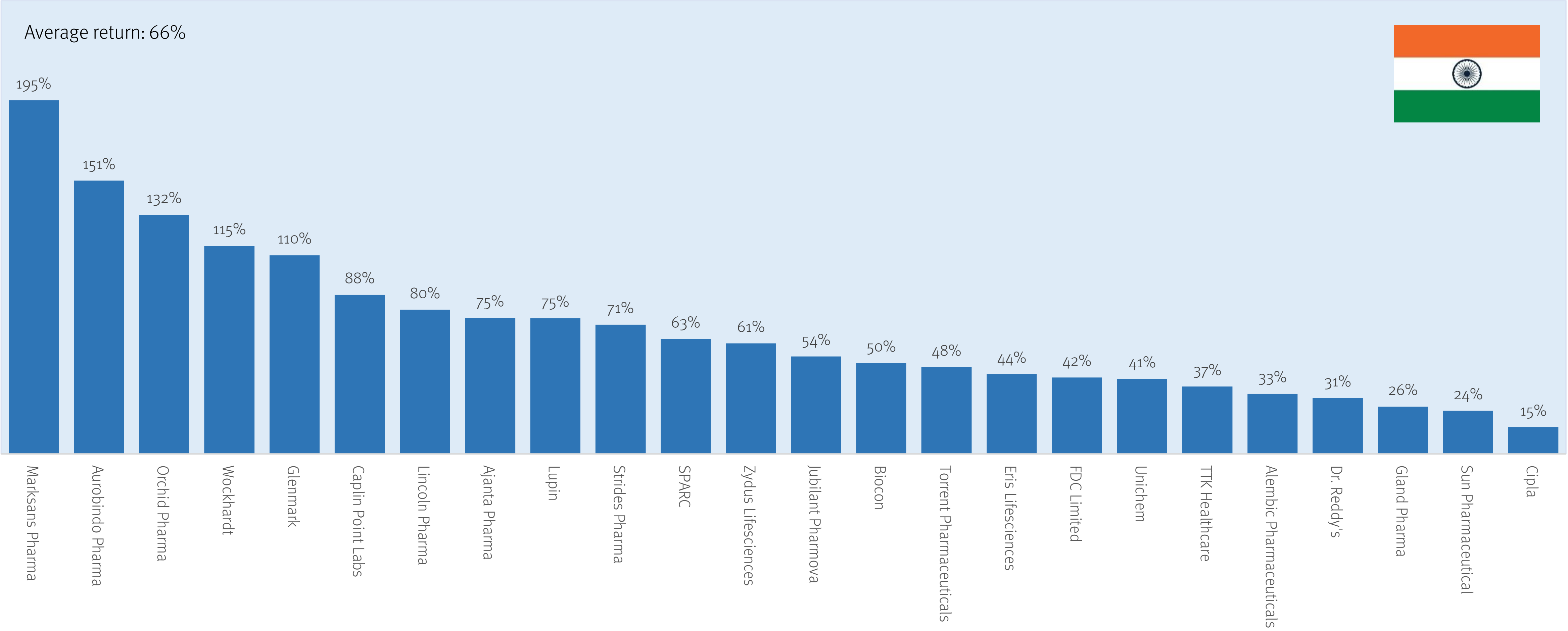


Source: CapitalIQ

India Pharma Had an Amazing 2023

Indian pharma have done well due to high domestic growth, a 12% domestic sanctioned price *increase* and improving conditions for the sale of generic drugs. The average return among top 25 Indian pharma in 2023 was a whopping 66%.

Percent Change in Market Cap of Top 25 Public Players in India Pharma, Jan 1 to Dec 30, 2023

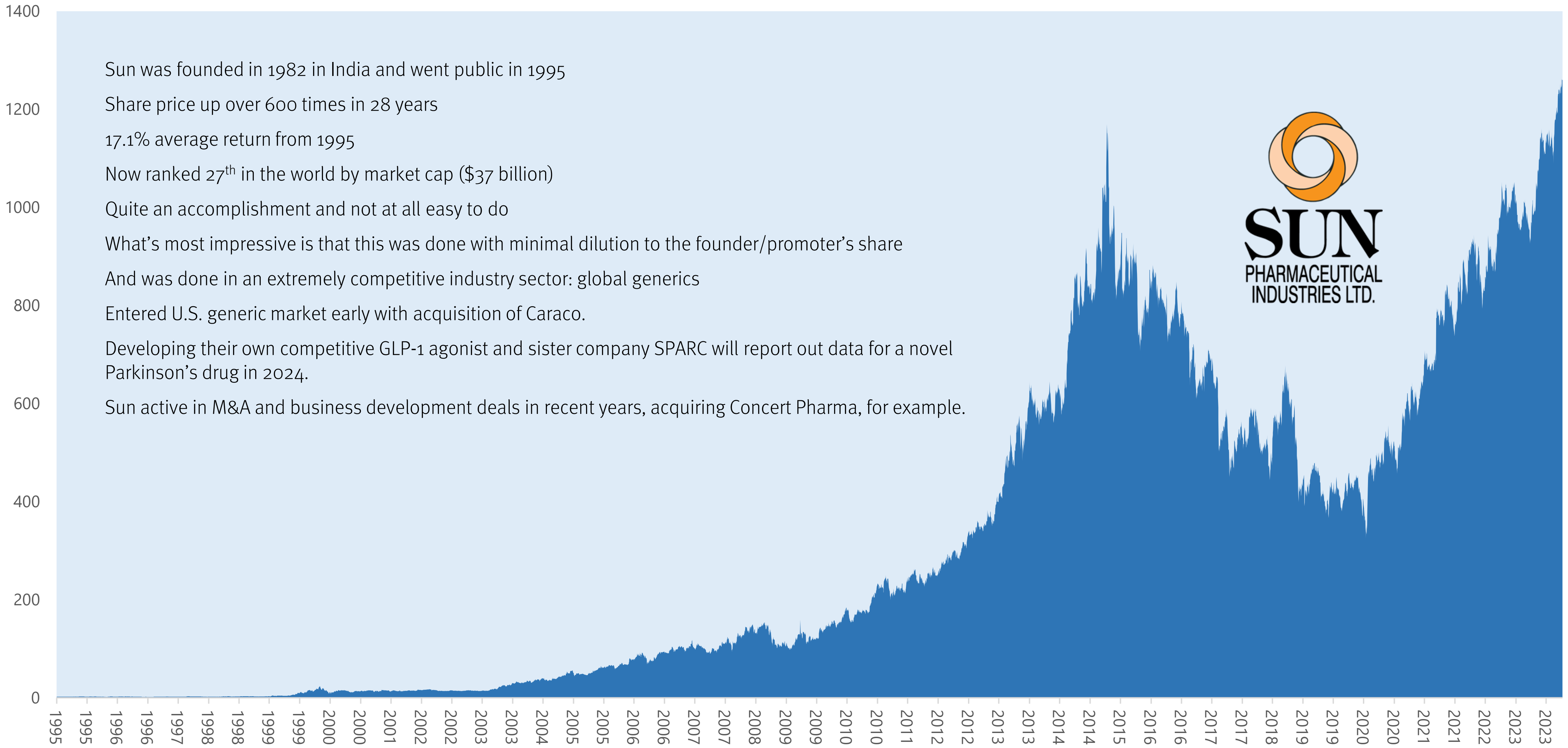


Source: CapitalIQ

Sun Pharma Increasingly a Globally Important Pharma

Sun Pharma Share Price ($USD, 1995 to Present)

- Sun was founded in 1982 in India and went public in 1995
- Share price up over 600 times in 28 years
- 17.1% average return from 1995
- Now ranked 27th in the world by market cap ($37 billion)
- Quite an accomplishment and not at all easy to do
- What’s most impressive is that this was done with minimal dilution to the founder/promoter’s share
- And was done in an extremely competitive industry sector: global generics
- Entered U.S. generic market early with acquisition of Caraco.
- Developing their own competitive GLP-1 agonist and sister company SPARC will report out data for a novel Parkinson’s drug in 2024.
- Sun active in M&A and business development deals in recent years, acquiring Concert Pharma, for example.

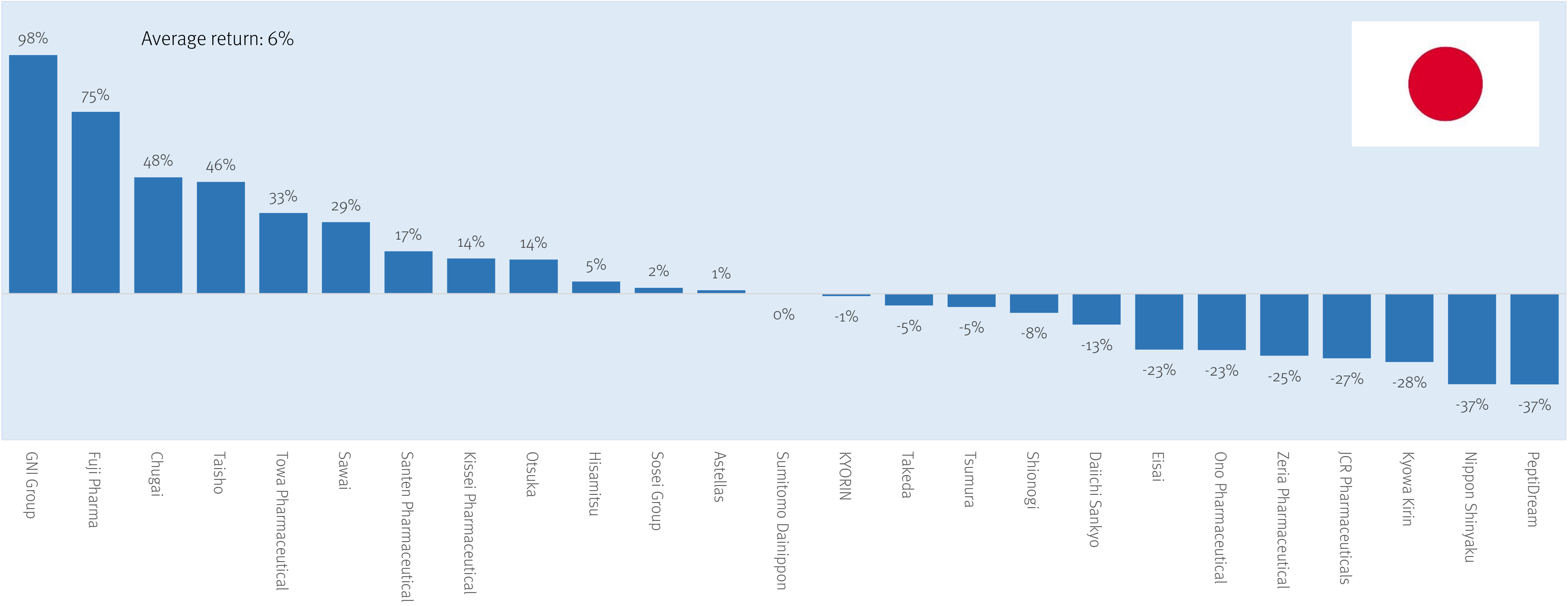


Source: CapitalIQ

Japan Pharma Mixed in 2023

The average return in Japan pharma was 6% in 2023. Japan biotech GNI Group did well on the back of IPF data. Fuji Pharma did well in Q4 2023 thanks to its biosimilar tie up with Alvotech. Chugai's performance was stellar and this Roche sub is now the world's 29th largest pharma by market cap. Taisho performed well on the back of a go private deal. Takeda was down 5% which dragged down the total performance of the group as did the -13% return for shareholders of Daiichi Sankyo – now the second largest company in Japan by cap.

Percent Change in Market Cap of Top 25 Public Players in Japan Pharma, Jan 1 to Dec 30, 2023



Source: CapitalIQ

Reordering of Largest Players by Value in Life Sciences

Enterprise Value ($mm) of Top Life Sciences Companies, Feb 8, 2021 to Dec 30, 2023

Value Rank (Dec 30 , 2023)	Company	Dec 30, 2023	Value Rank (Jun 30 , 2023)	Jun 30, 2023	Value Rank (June 17, 2022)	Jun 17, 2022	Value Rank (Feb 8, 2021)	Feb 8, 2021
1	Lilly	$541,487	2	$459,931	4	$275,160	9	$199,050
2	novo nordisk	$458,427	3	$360,891	6	$239,281	11	$163,171
3	Johnson&Johnson	$383.727	1	$491,331	1	$446,793	1	$441,136
4	abbvie	$321,532	5	$293,471	2	$310,463	3	$267,777
5	MERCK	$302,407	4	$313,226	7	$236,919	7	$211,317
6	Roche	$261,190	6	$270,006	3	$278,801	2	$301,332
7	AstraZeneca	$234,801	8	$233,280	8	$226,761	8	$207,897
8	ThermoFisher SCIENTIFIC	$234,504	7	$248,828	9	$212,736	12	$150,063
9	NOVARTIS	$220,692	9	$228,384	11	$188,764	5	$231,398
10	Abbott	$199,953	11	$197,296	11	$281,482	6	$227339

Source: CapitalIQ

Lilly has the highest enterprise value of any life sciences company in the world (up from a ranking of #9 on Feb 8, 2021).

In 2023, we saw Novo Nordisk pass J&J by value and is now in the #2 spot.

J&J, the long-time industry value leader now sits in the #3 spot and, extraordinarily, is worth $153 billion less than Lilly in enterprise value. This is partly due to the recent spinoff of J&J's consumer business, Kenvue.

Roche was #2 at the start of the Pandemic and is now #6 as it has failed to overcome drug LOE's with new products fast enough. In Feb 2021 Novartis was the fifth largest player and dropped to #11 before coming back to #9 over the last year on the strength of new drugs.

Pfizer dropped off the list by December. Ranked #4 on Feb 8, 2021, Pfizer is now ranked #11 globally by life sciences sector EV.

The pharma rankings have been massively reshuffled in three years.

2023 Was Challenging for Many in Big Pharma

It is becoming ever tougher to drive growth in the pharma industry.

Sanofi shares fall 19% after cut to profit outlook

French pharma group announces consumer unit split and increased R&D investment

BMS Reports Q2 Sales Miss Amid Generic Competition, Lowers Full-Year Guidance

Published: Jul 27, 2023 | By Kate Goodwin

Takeda Reports $770M Write-Down, Cuts Profit Forecast by 71% for FY2023

Published: Oct 26, 2023 | By Kate Goodwin

HEALTH AND SCIENCE

Pfizer slashes full-year earnings and revenue guidance as Covid treatment, vaccine sales slump

PUBLISHED FRI, OCT 13 2023·5:47 PM EDT | UPDATED MON, OCT 16 2023·9:53 AM EDT

Bayer chief blames thin drug pipeline on 'years of under-investment'

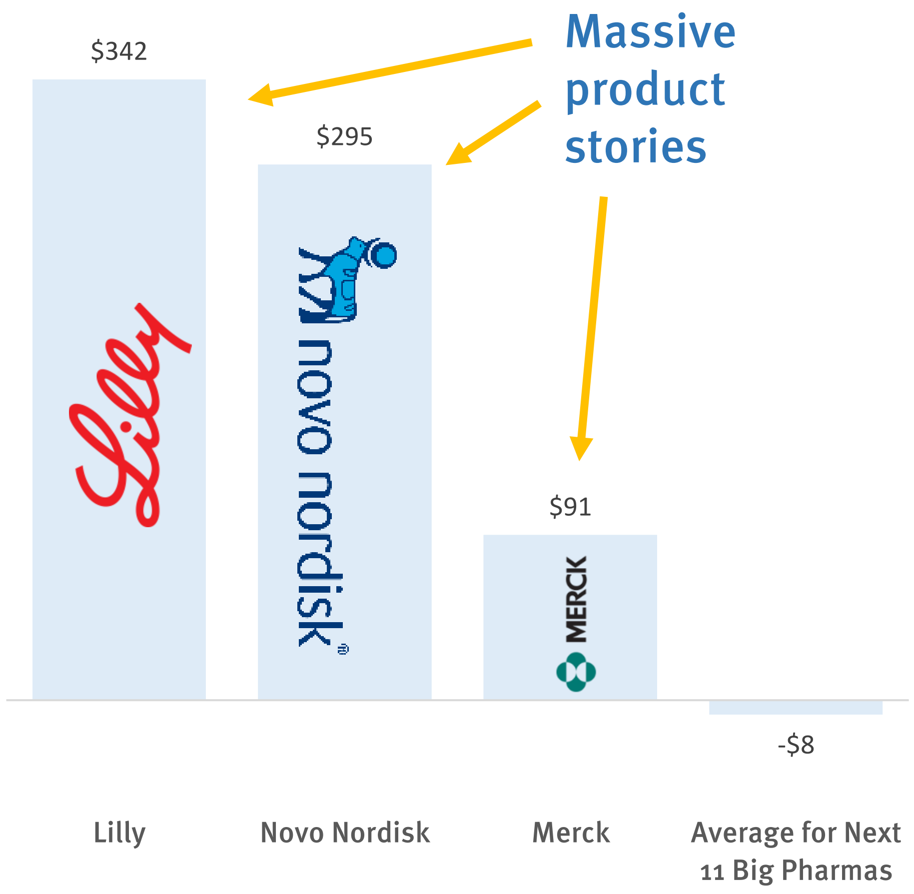
Bill Anderson says group is generating a series of promising new drugs after R&D strategy change

The Rules of the Game for Big Pharma Changed in 2023

The rules of the game changed. There is a new thought process: “Go Big or Go Home”

- Real drugs for real diseases with real data are now in vogue.
- Massive polyindication drugs are in vogue.
- The big moves have been in obesity drugs where there is massive scale possible due to many indications and widespread application.
- “Big efficacy on big markets” is the new mantra.
- Precision on narrow markets was the old mantra.
- Payors, patients and investors want to see drugs that really work for major diseases.
- Most pharmas instead are showing large pipelines of mid-sized drugs ($1bn to $10bn in size). The economics of buying, building and launching these products are not terribly favorable. This is visible in the chart at right.

Change in Enterprise Value of Big Pharmas, Feb 7, 2020 to Dec 30, 2023 ($ Billions)



Source: CapitalIQ

Big Pharma Finding that Diversified Pipelines Aren't Doing it Anymore

Despite impressive progress, all four of these companies (and others) have failed to generate share value since the Pandemic started. Pipelines with a bunch of $1bn to $10bn products are not seen as a source of long-term growth by investors.

NOVARTIS

Strong pipeline across our core therapeutic areas with planned submissions by 2027

Select examples

Kisqali® ●●●
Adjuvant breast cancer filed in EMA in Q3 2023. FDA regulatory submission expected in Q4 2023

Pluvicto® ●●
mCRPC (post-ARDT, pre-taxane), FDA regulatory submission expected in 2024
mHSPC readout expected in 2025

Iptacopan ●●●
PNH filed with FDA and EMA in Q2 2023
IgAN submission expected in 2024[1]
C3G readout expected in Q4 2023

Atrasentan ●
IgAN submission expected in 2024[1]

Remibrutinib ●●●
CSU submission expected in 2024
Multiple sclerosis and CINDU readouts expected in 2026

Lutathera® ●
GEP-NET 1L G3 EU submission expected in 2024

Scemblix® ●●
1L CML-CP readout expected in 2024

OAV-101 ●●
SMA IT readout expected in 2024

Pelacarsen ●●●
CVRR readout expected in 2025

Ianalumab ●●●
1L and 2L ITP readouts expected in 2025
Sjögren's readout expected in 2026

Zigakibart ●
IgAN readout expected in 2026

1. US submission for accelerated approval. Unprobabilized estimated peak sales of all asset indications in late-stage development: ● > USD 1bn ●● > USD 2bn ●●● > USD 3bn

BAYER

Q3: Launch Assets, Eylea and Radiology Business With Ongoing Strong Performance, Offsetting Softness in Mature Portfolio

Q3 2023 Sales by Key Products

Product	m€ (2023)	Δ% cpa yoy
Xarelto	€ 1,052	+0%
Eylea	€ 802	+5%
Radiology*	€ 509	+7%
IUD Family	€ 340	-2%
Nubeqa	€ 232	+97%
HEM Franchise	€ 173	-16%
Yaz Family	€ 172	+1%
Adempas	€ 170	+6%
Aspirin Cardio	€ 150	-16%
Adalat	€ 114	-44%
Kerendia	€ 66	+146%

■ 2023 ■ 2022

* Radiology comprises 13 brands in total, among others CT Fluid Delivery, Ultravist and Gadovist product family

Key Drivers

- **Xarelto:** solid volume growth in major markets offset by UK pricing and China headwinds and lower US royalties
- **Eylea:** continued strong volume trend in all marketed regions partially held back by softer pricing, particularly in Europe
- **Nubeqa:** sales almost doubled again, being the fastest growing ARI[1] in the US
- **Kerendia:** growth driven by continued US market uptake
- **Radiology:** substantial sales gain, particularly for CT Fluid Delivery and Ultravist
- **IUD Family:** volume declines largely compensated by higher prices
- **HEM Franchise:** decline mostly due to competition, mainly in US and China
- **Aspirin Cardio:** sales decline driven by lower channel demand
- **Adalat:** sales continued to be impacted by VBP in China

[1] ARI: Androgen Receptor Inhibitor
15 Bayer Q3 2023 Investor Webinar /// November 8th, 2023

Johnson&Johnson

Our future growth will be fueled by 20+ novel therapies and 50+ product expansions*

	Select marketed brands	Select anticipated novel therapy approvals & filings through 2030
Assets with $5B+ Potential[1,3]	DARZALEX (daratumumab); CARVYKTI (ciltacabtagene autoleucel); Tremfya (guselkumab); TALVEY (talquetamab-tgvs); TECVAYLI (teclistamab); INVEGA SUSTENNA (paliperidone palmitate)	RYBREVANT / lazertinib – Lung Cancer; CD20-based CAR-T[2] – Lymphoma; Anti-Tau mAb – Alzheimer's Disease; JNJ-2113 Targeted oral peptide – Autoimmune Diseases; milvexian – Thrombosis; nipocalimab – Autoantibody Diseases; TARIS Platform – Bladder Cancer
Assets with $1 – 5B Potential[1,3]	Erleada (apalutamide); Spravato (esketamine); Xarelto (rivaroxaban); Opsumit (macitentan); Uptravi (selexipag); Akeega (niraparib/abiraterone acetate)	JNJ-1887 sCD59 – Geographic Atrophy; seltorexant – Major Depressive Disorder; ExPEC – Multivalent Vaccine (9V); aticaprant – Major Depressive Disorder; Trispecifics[2] – Hematologic Malignancies; JNJ-8114 PSMA / CD3 – Prostate Cancer; JNJ-4804[5] – Inflammatory Bowel Disease; RPGR Gene Therapy – Retinitis Pigmentosa; JNJ-8343 KLK2 / CD3 – Prostate Cancer; JNJ-6420 ^{225}Ac KLK2 – Prostate Cancer; Menin-KMT2A inhibitor – Hematologic Malignancies; JNJ-1459 – Psoriasis

$5B+ potential asset in 2021 Analyst Day | ONC | IMM | NS | Select Other Areas

Bristol Myers Squibb

New product portfolio significantly de-risked with important catalysts ahead

Product	Milestones Achieved	Future Catalysts
CAMZYOS	✓ Camzyos oHCM	• Camzyos nHCM
Opdualag	✓ Opdualag 1L Mel FDC	• Opdualag 1L NSCLC • Opdualag Adj. Mel • Opdualag 2L+ MSS CRC
SOTYKTU	✓ Sotyktu PsO	• Sotyktu PsA • Sotyktu SLE
Reblozyl	✓ Reblozyl 2L TD MDS ✓ Reblozyl 1L MDS	• Reblozyl MF
Breyanzi	✓ Breyanzi 3L+ LBCL ✓ Breyanzi 2L LBCL	• Breyanzi 3L+ CLL • Breyanzi 3L+ iNHL
ZEPOSIA	✓ Zeposia MS ✓ Zeposia UC	• Zeposia CD
Abecma	✓ Abecma 5L+ ✓ Abecma 3-5L	

$25B+ Non-Risk Adjusted*

2030	
$4B+	CAMZYOS
$4B+	Opdualag
$4B+	SOTYKTU
$4B+	Reblozyl
$3B+	Breyanzi
$3B+	ZEPOSIA
$1B+	Abecma

Bristol Myers Squibb
*Non-risk adjusted revenue potential, subject to positive registrational trials and health authority approval
Note: Onureg & Inrebic <$1B NRA
Financial projections may contain non promoted sales. BMS promotes only according to label

Not for Product Promotional Use 138

Big Pharma Scale and Returns vs. Peak Sales of Top Product

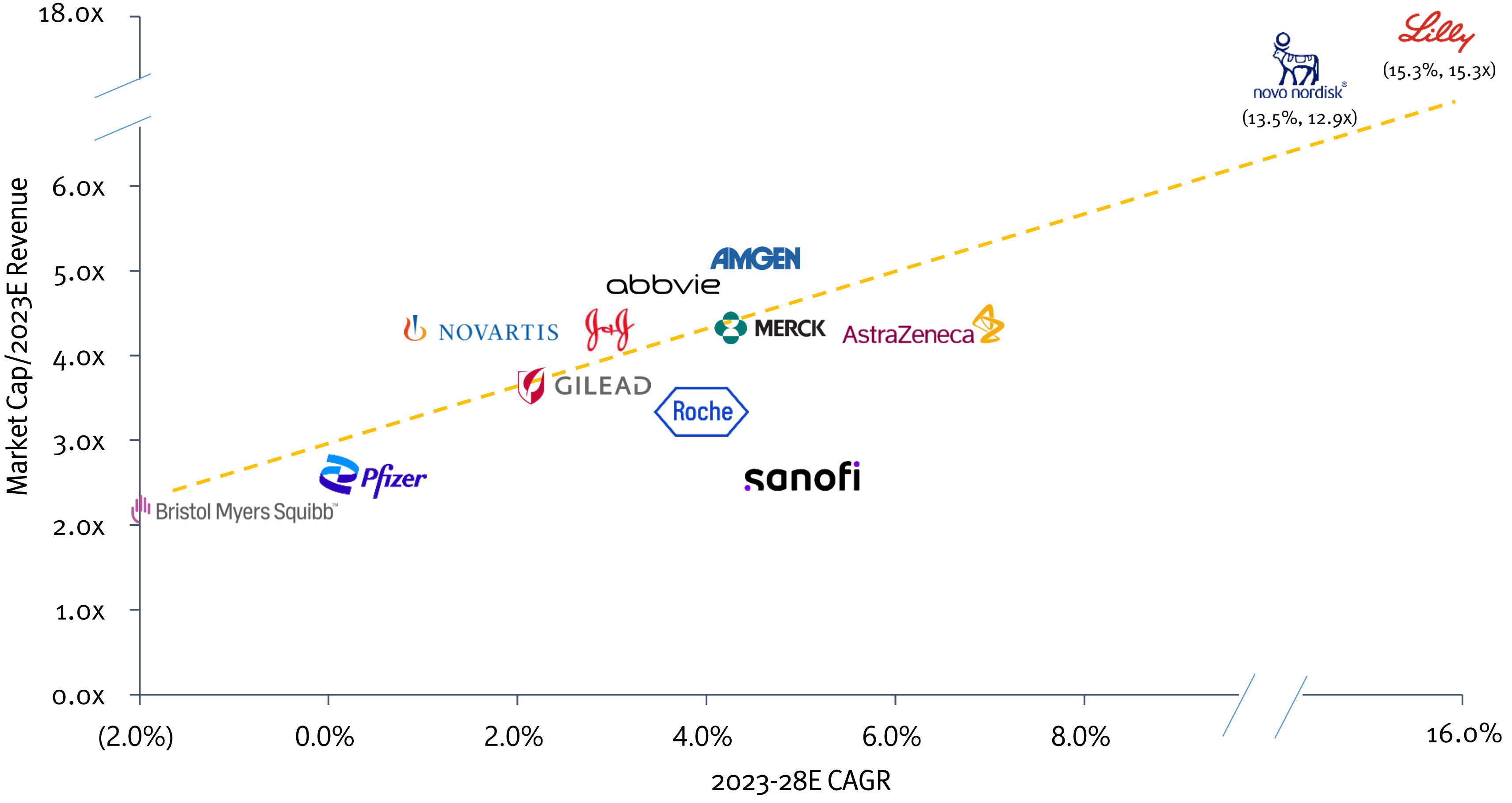
All of the top five pharmas by market cap today have a product with $20 billion or more in consensus forecast peak sales.

>15% change in market cap during both 2Y and 5Y (computed to Dec 18, 2023)

(in $mm)	Close	Market		Change in Market Cap (12/18/23)			Top Selling Product		
Company	Price (12/18)	Cap (12/18)	EV	1Y	2Y	5Y	Brand Name	Launch Year	Est. Peak Sales
Lilly	$572.04	$514,440	$531,703	50%	106%	356%	Mounjaro & Zepbound	2018 & 21	$50bn
novo nordisk	$97.19	$433,403	$430,320	47%	66%	286%	Ozempic & Wegovy	2022 & 24E	$35bn
Johnson&Johnson	$155.16	$373,513	$379,923	(19%)	(17%)	5%	Darzalex	2015	$20bn
abbvie	$154.04	$271,963	$319,890	(6%)	18%	111%	Skyrizi	2019	$20bn
MERCK	$105.11	$266,351	$292,499	(3%)	40%	34%	Keytruda	2014	$30bn
Roche	$281.79	$226,982	$253,349	(22%)	(30%)	6%	Ocrevus	2017	$8bn
AstraZeneca	$129.37	$200,510	$225,969	(7%)	18%	106%	Tagrisso	2015	$8bn
NOVARTIS	$97.78	$200,990	$214,124	2%	11%	(0%)	Cosentyx	2015	$7bn
Pfizer	$26.63	$150,364	$170,585	(48%)	(54%)	(41%)	Prevnar	2009	$7bn
AMGEN	$275.45	$147,415	$173,142	(1%)	19%	20%	AMG133	2027E	$5bn+
sanofi	$95.71	$120,010	$134,582	2%	(2%)	10%	Dupixent	2017	$20bn[1]
Bristol Myers Squibb	$50.89	$103,549	$134,926	(41%)	(23%)	22%	Eliquis	2011	$13bn
GILEAD	$80.33	$100,095	$115,875	(9%)	12%	18%	Biktarvy	2018	$15bn

Sources: CapitalIQ, Equity Research; Note: The analysis included 12 US & EU listed pharmaceutical companies with >$100bn EV; 1. Partnership with Regeneron

Big Pharma Revenue Multiples Linked to Growth Prospects



Source: CapitalIQ; Note: The analysis included 12 US & EU listed pharmaceutical companies with >$100bn EV

Here we plot analyst consensus expectations of topline growth against the ratio of market cap to estimated 2023 revenue.

Higher multiples, not surprisingly, are linked to higher growth expectations over the five years to come. Lilly and Novo enjoy very high revenue multiples given double digit long-term growth expectations held by analysts.

Some companies are trading below the curve such as Sanofi and Roche.

One could argue that investors believe that analysts forecasts of future growth are too optimistic for these companies.

In contrast, Novartis, AbbVie, Amgen, Novo and Lilly are getting a bit of a premium to their growth prospects.

Gap Between Top Healthcare and Tech Stocks Widened in 2023

The world's top five tech companies were worth **$10.7 trillion** at the end of 2023.

The world's top five healthcare companies were worth **$2.2 trillion** at the end of 2023.

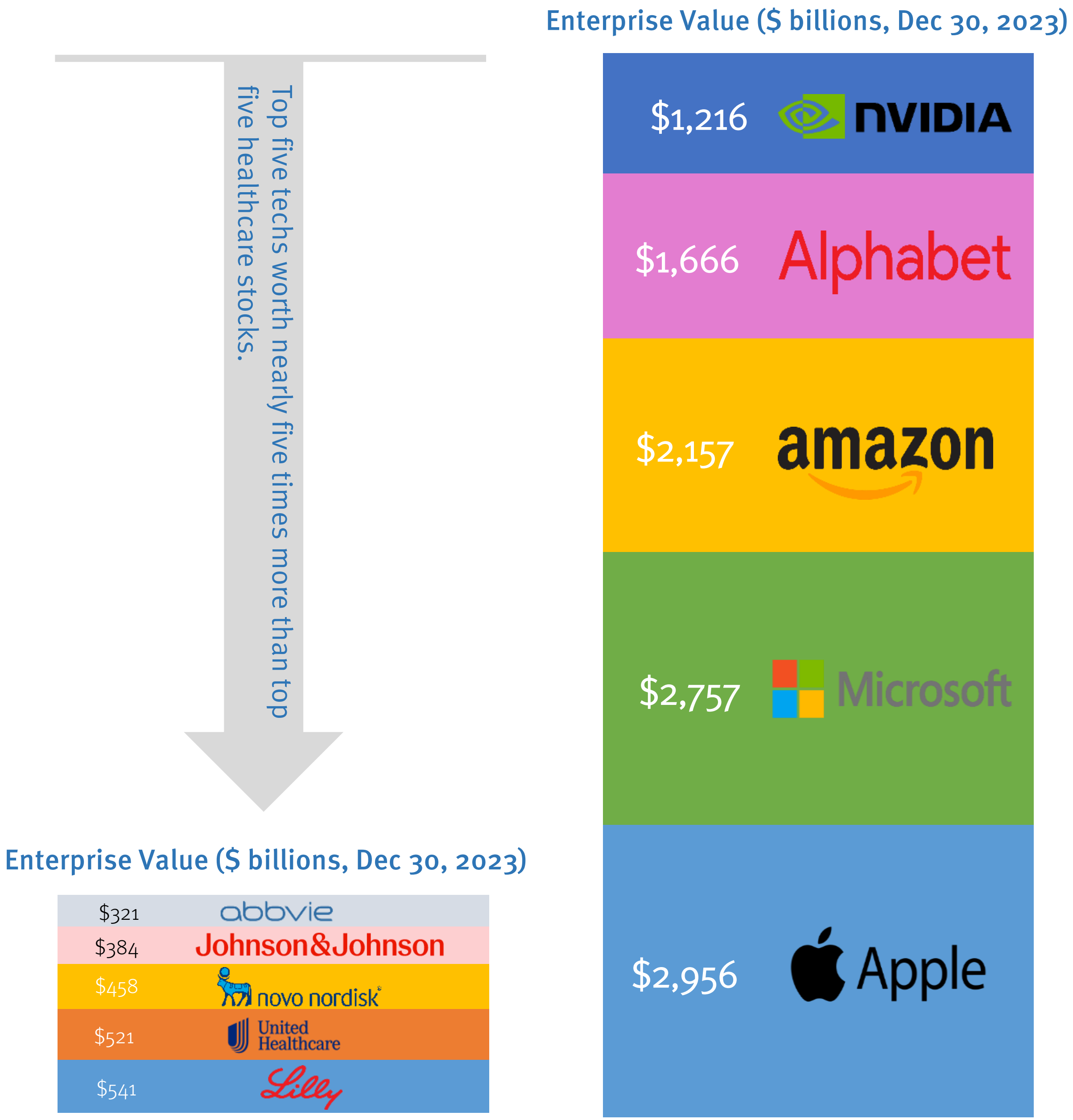
Each of the top three techs are individually larger than the top five healthcare companies **combined**.

The gap widened in 2023 from approximately 4:1 to 5:1.

But the GDP contribution of healthcare is far larger than the GDP contribution of technology

Healthcare is 20%+ of U.S. GDP whereas tech is around 7%.

Despite what the Biden Administration would have you believe, high competition and lousy "monopolies" have increasingly challenged the large pharma sector.



Source: CapitalIQ

Limited Patent Terms Beset Pharma Sector

David Wainer, *Wall Street Journal*, Nov 29, 2023

There are five tech companies valued at over $1 trillion. In healthcare, the closest contender is Eli Lilly.

This year it became the first big pharmaceutical to surpass a market capitalization of $500 billion thanks to the popularity of its obesity and diabetes medications and, to a lesser extent, its experimental Alzheimer's drug. But hanging over Lilly and rival Novo Nordisk is a reality that puts the brakes on big pharma's ascent: the patent cliff.

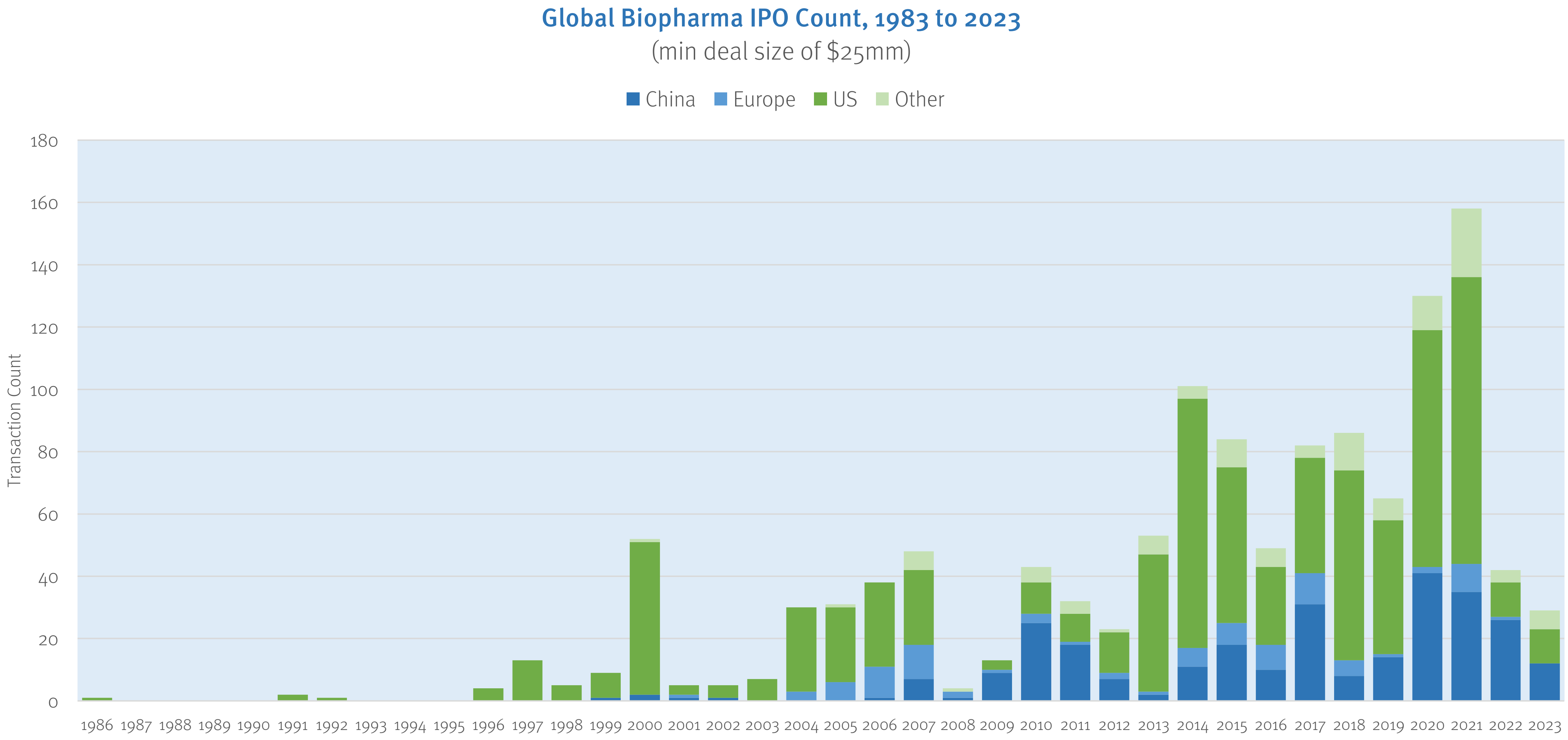
There are several reasons why there isn't a big pharma company in the trillion dollar club, but the boom-and-bust nature of drug development is high on the list. Unlike Apple, which hypothetically can make huge margins off the iPhone for perpetuity, U.S. drug companies have a limited period from which to profit from their innovation. As their patents expire and generic competitors enter the market, sales plunge. Pharma executives, overly focused on short-term growth, don't often prepare their companies for that.

Note: LLY was up 10% in the first 4 days of 2024 ($40bn in market cap) and now has a market cap of over $600 billion – on the back of excitement for its obesity franchise.

Source: https://www.wsj.com/health/pharma/can-a-big-pharma-ever-be-worth-1-trillion-703583ae

The Biopharma IPO Market

Aggregate Global IPO Count in 2023 Was Down 82% From 2021 Levels



Source: Stifel and CapitalIQ. IPOs are shown for R&D-Stage companies that went public anywhere in the world that raised at least $25 million.

Class of 2023 NASDAQ IPO's Traded Up On Average

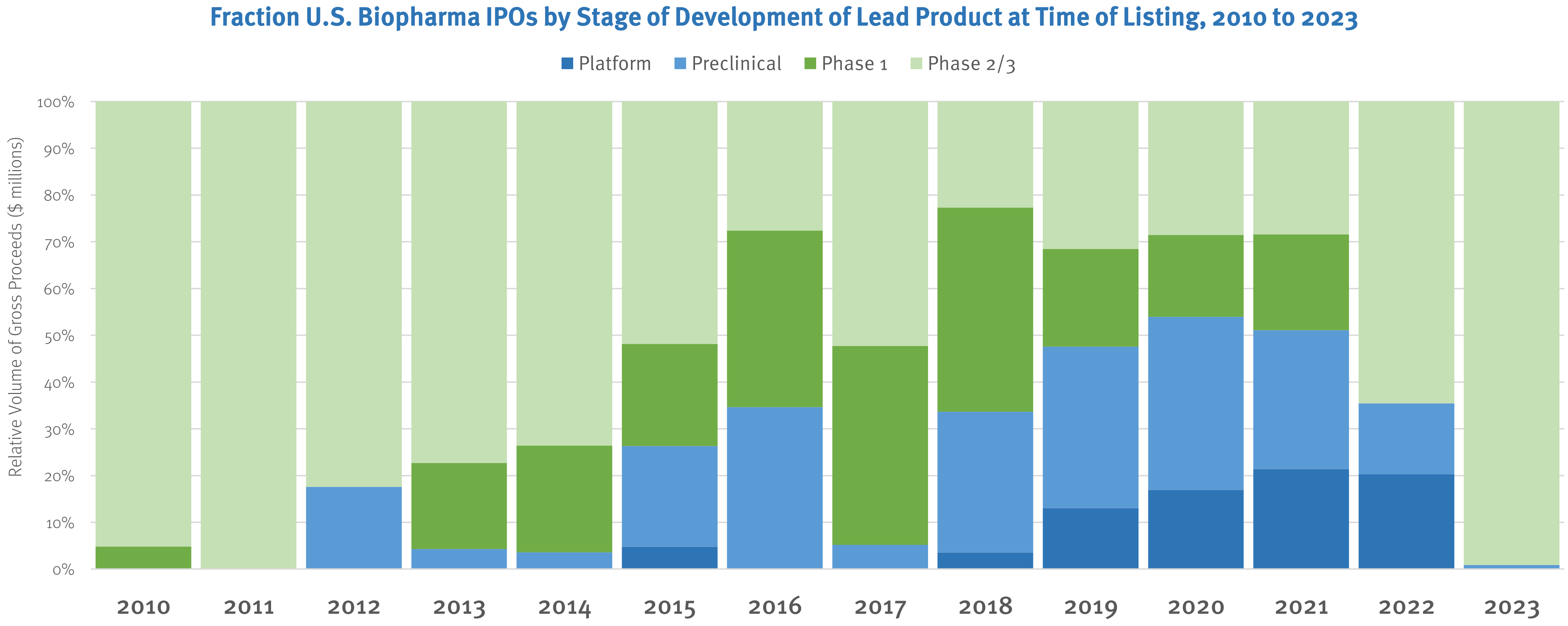
Issuer	Amount Raised ($mm)	Offer Price	Price at Offer Date Close	Price on Jan 2, 2024	Current / Offer
Turnstone Biologics	$80	$12.0	$11.0	$2.6	-78.4%
Sagimet Biosciences	$85	$16.0	$16.0	$5.3	-66.7%
Apogee Therapeutics	$300	$17.0	$21.2	$28.5	67.7%
Acelyrin	$540	$18.0	$23.5	$7.9	-55.9%
CARGO Therapeutics	$281	$15.0	$14.5	$22.7	51.5%
Lexeo Therapeutics Inc.	$100	$11.0	$10.1	$14.8	34.8%
RayzeBio Inc.	$358	$18.0	$24.0	$62.0	244.2%
Neumora Therapeutics Inc.	$250	$17.0	$16.3	$16.9	-0.6%
Mineralys Therapeutics	$192	$16.0	$18.0	$8.7	-45.8%
Structure Therapeutics	$161	$15.0	$23.3	$40.4	169.3%

Average	32.0%
Median	17.1%

Source: Stifel and CapitalIQ. IPOs are shown for Nasdaq listed R&D-Stage companies that raised at least $50 million.

U.S. IPO's in 2023 Were Overwhelmingly for Companies in Phase 2 or Later Development

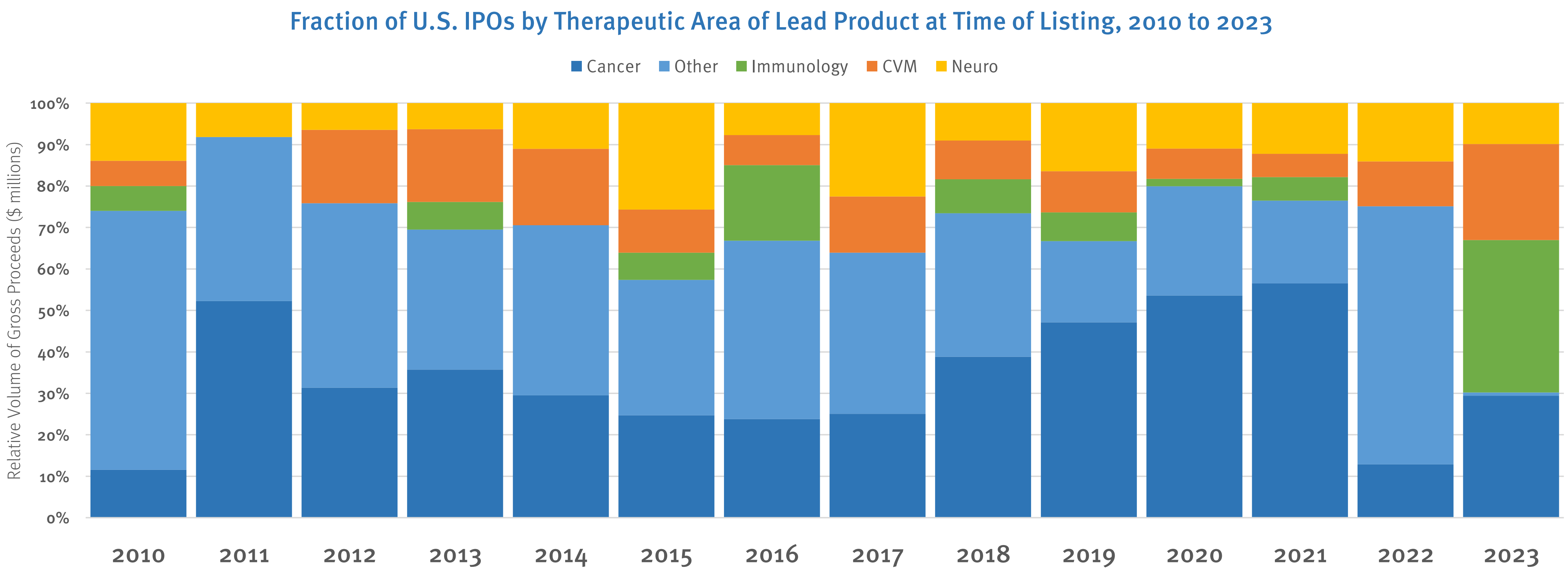
We did not see any pre-clinical or a platform companies go public in 2023. In contrast, in 2020 half of IPOs were for pre-clinical or platform companies.



Source: DealForma. IPOs are shown for Nasdaq and NYSE listed R&D-Stage companies that raised at least $50 million.

In 2023 the U.S. IPO Market Was Selectively Open to Good Companies in Cardio, Obesity, Oncology and Immunology

The IPO market was accommodating in 2023 to companies pursuing cardiometabolic, obesity, oncology and immunology stories. The relative volume of oncology transactions was down a lot. Transactions in other areas (ophthalmology, urology, GI etc) disappeared in 2023 after having been active for years before.

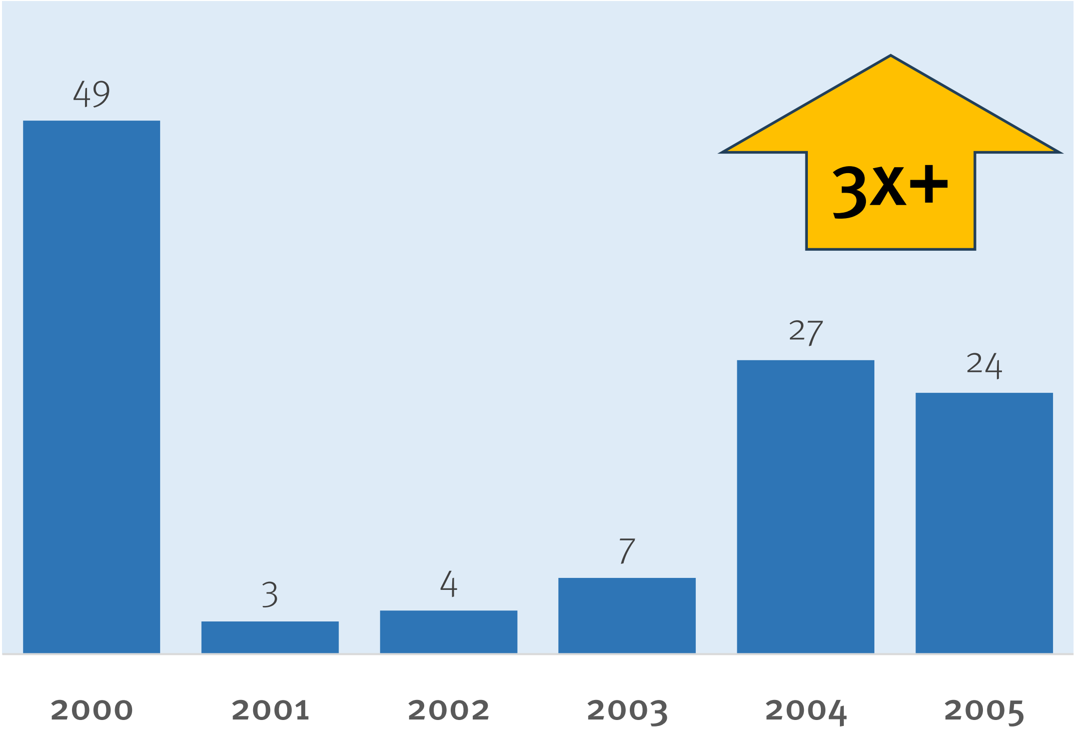


Source: DealForma. IPOs are shown for Nasdaq and NYSE listed R&D-Stage companies.. Immunology encompasses investments in autoimmune and inflammation.

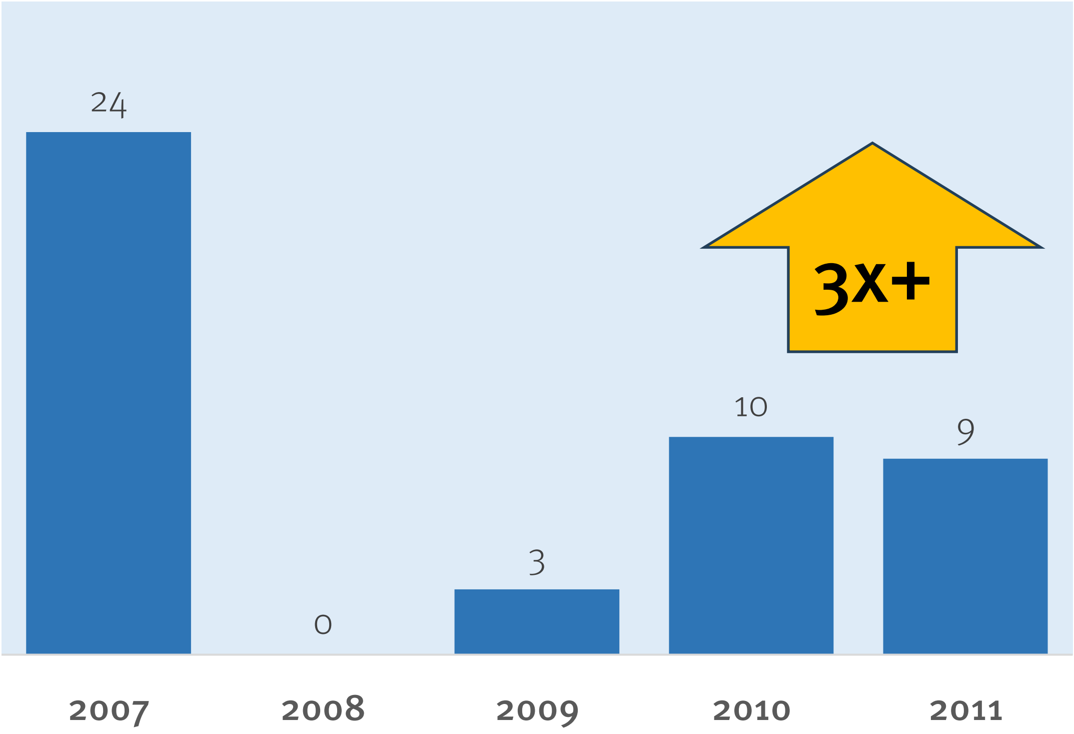
IPO Outlook for 2024: Historic Analogues

With a rally in biotech stocks, an abundance of good private companies and a low VIX, the conditions are ideal for a strong rebound in IPOs in 2024. The historic analogues shown here are striking in their similarity. Deal volume plunges in year, comes back a little in year 2 and then comes back a lot more in years 3 and 4 (but not to the previous high level). If history is any guide, we would expect to see something like 25 to 40 Nasdaq biotech IPOs get done in 2024. The market will remain focused on themes like CV, ADCs, radiopharma, CNS, obesity and immunology (especially B-cell). We expect to see platform IPOs as well in key areas like AI and RNA.

Count of NASDAQ Biotech IPOs Following IPO Crash of 2001 and Recovery in 2004/2005



Count of NASDAQ Biotech IPOs Following IPO Crash of 2008 and Recovery in 2010/2011

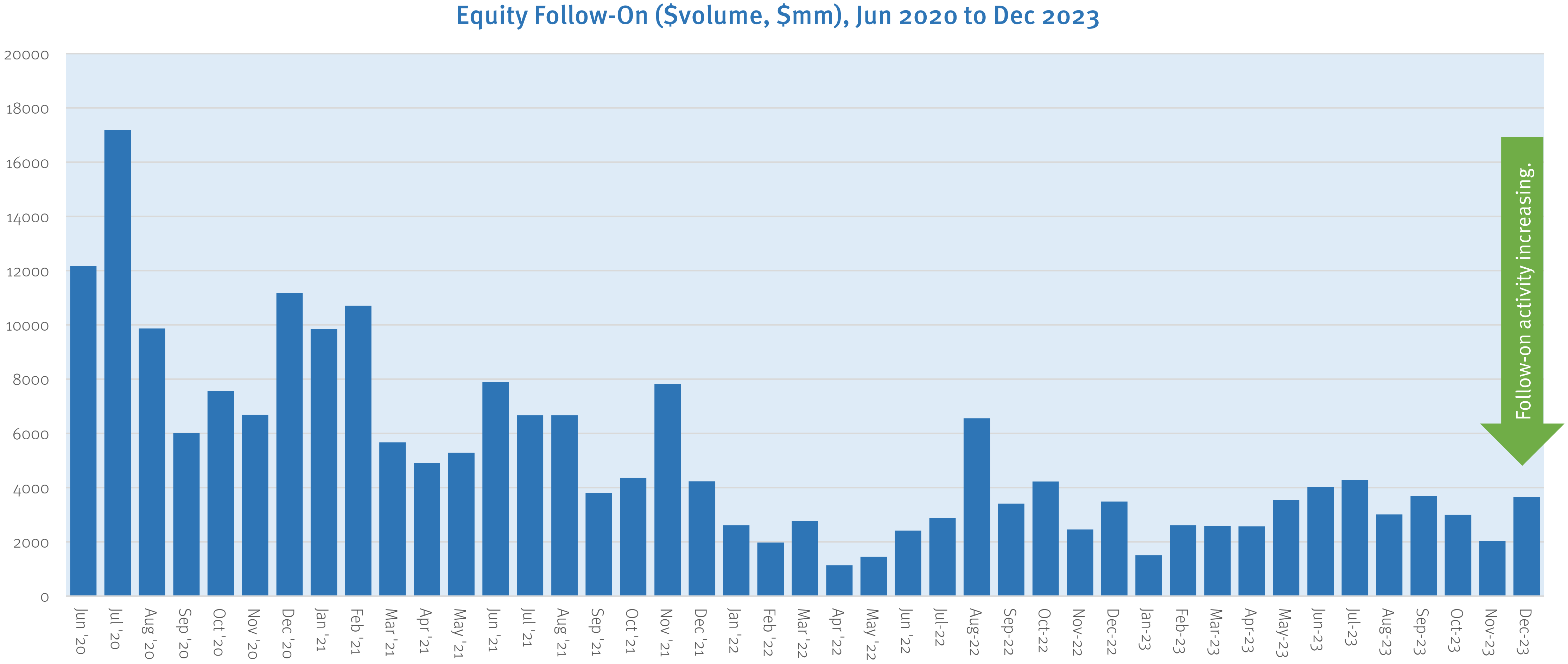


Source: CapitalIQ

The Biopharma Follow-on Equity / Secondary Market

Monthly Global Biopharma Follow-on Equity Volume

Last month saw nearly $4 billion in follow-on volume in the equity capital markets for the first time in a quarter. The biotech equity capital markets are clearly improving. Nonetheless, market activity is nowhere near where it was in 2020.

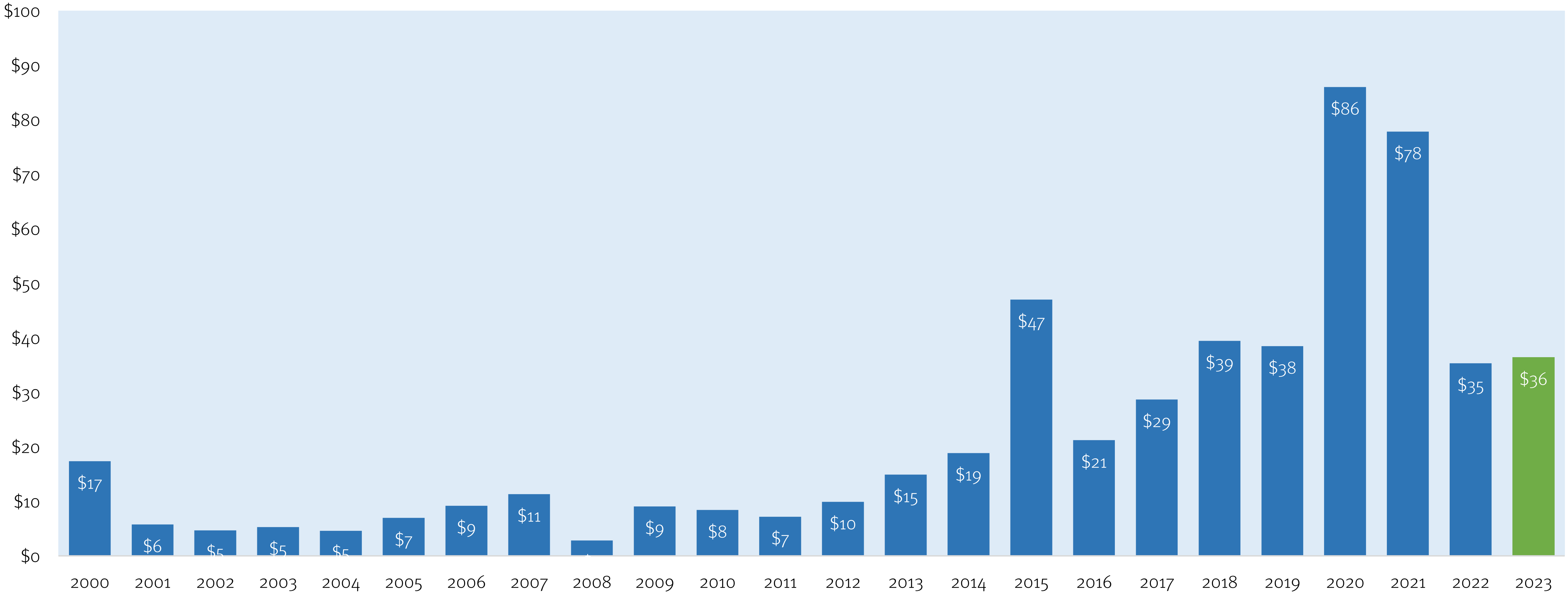


Source: Data from CapitalIQ. Follow-ons from all countries and valuations are included in this analysis.

2023 Follow-On Volume In Line with Levels Seen in 2022 and in the 2017 to 2019 Period

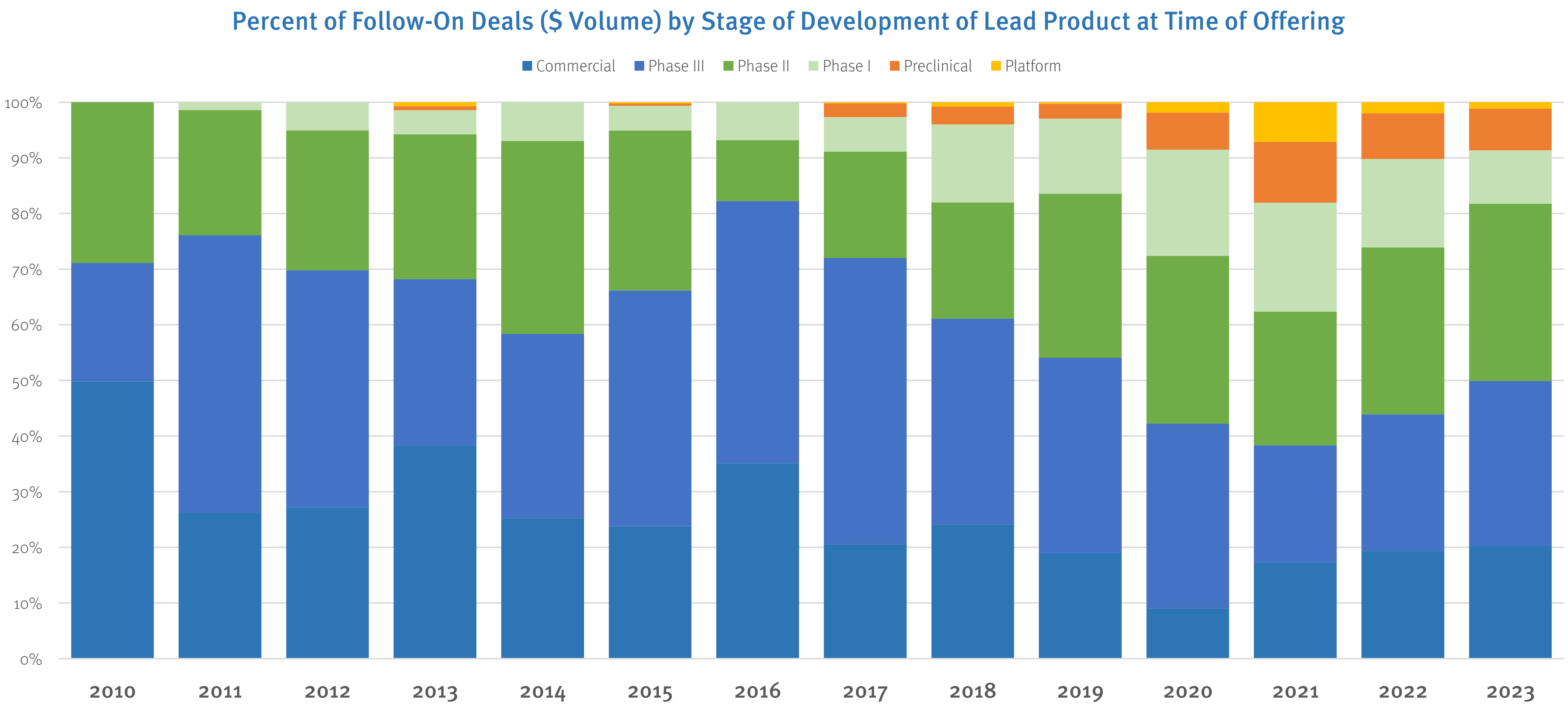
Follow-on Equity Volume in the Biopharma Sector, 2000 - 2023

($ Billions, Worldwide)



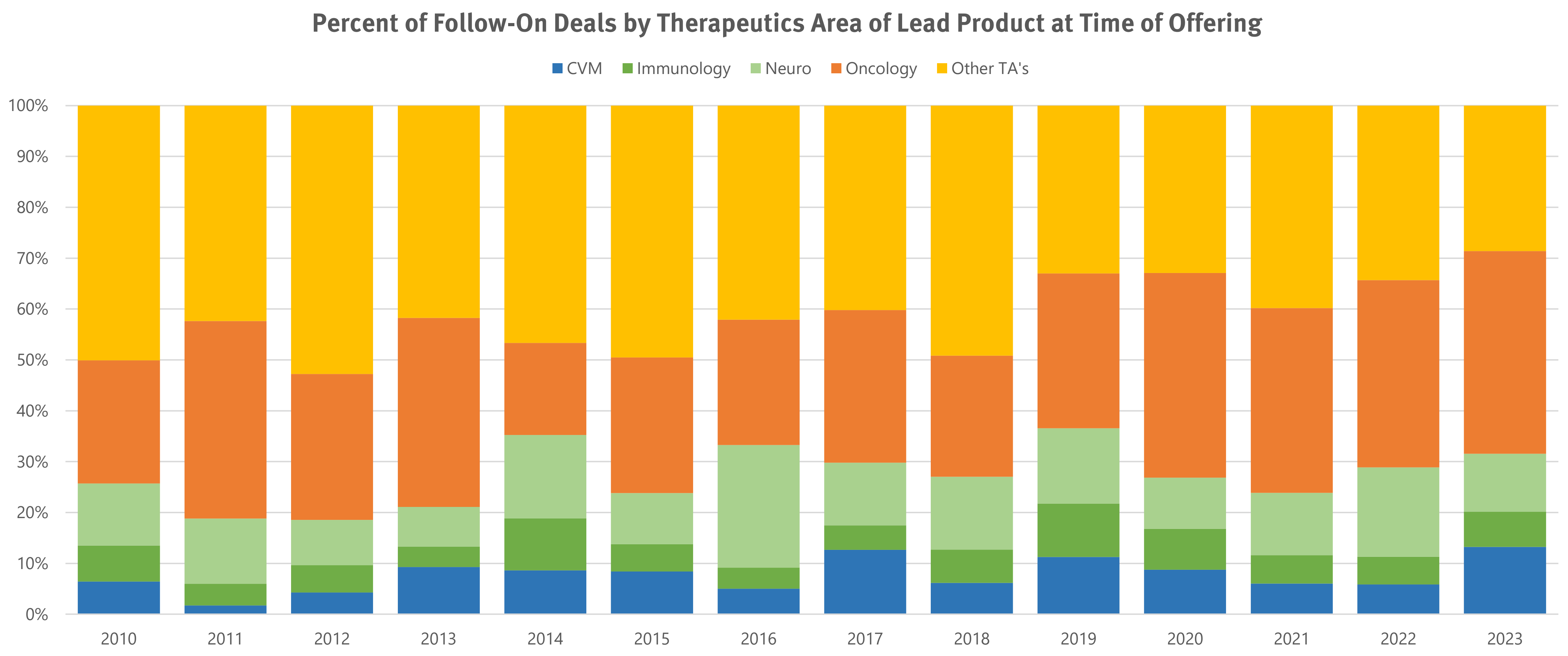
Source: Data from CapitalIQ and Stifel Database

Preclinical and Phase 1 Follow-On Deals Nearly Extinct in 2023 - Deals Overwhelmingly for Companies with Clinical Data



Source: DealForma. Follow-Ons in Europe, North America, Israel and Taiwan of $15 million or more included in this analysis.

In 2023, the Follow-on Market Saw Increased Volume in Cardiometabolic (CVM) and Immunology While Oncology Held Steady

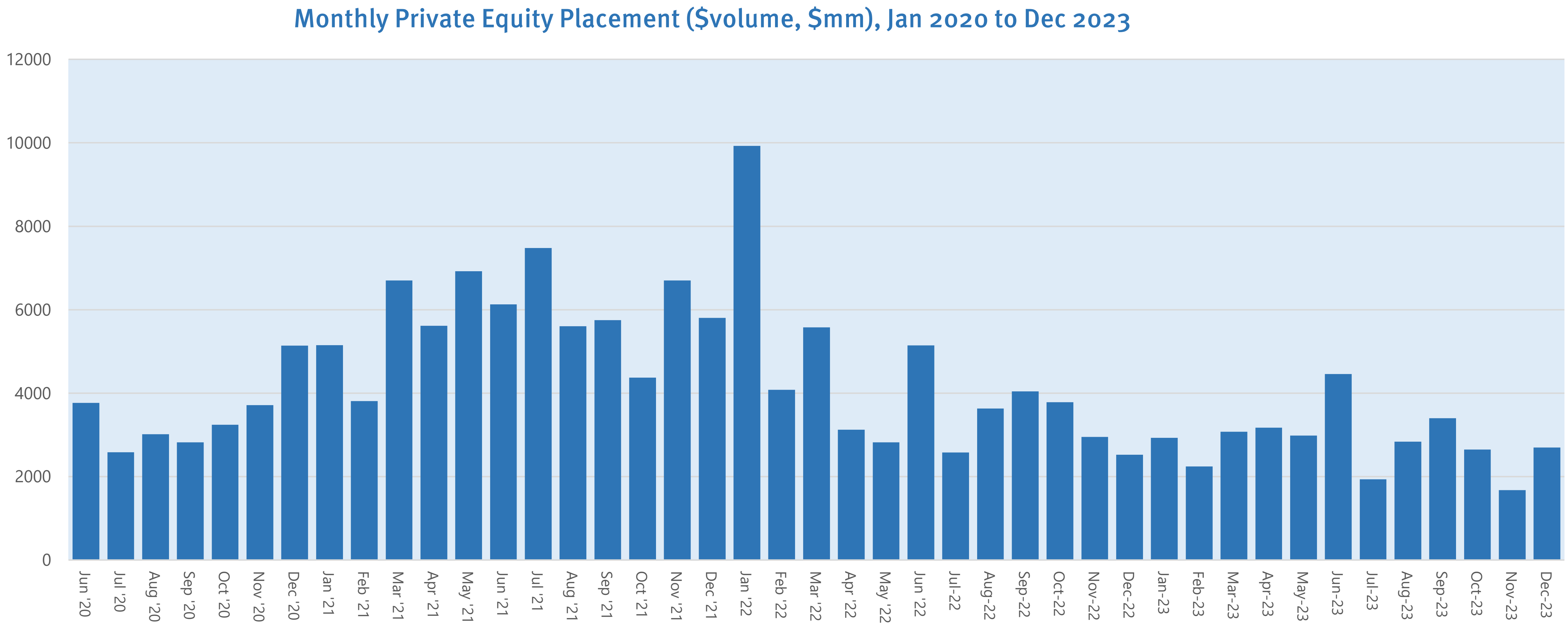


Source: DealForma. IPO’s in the U.S. of $25 million or more included in this analysis. I&I encompasses investments in autoimmune and inflammation. CVM encompasses, cardiometabolic, diabetes, endocrinology and renal.

Venture Equity Environment

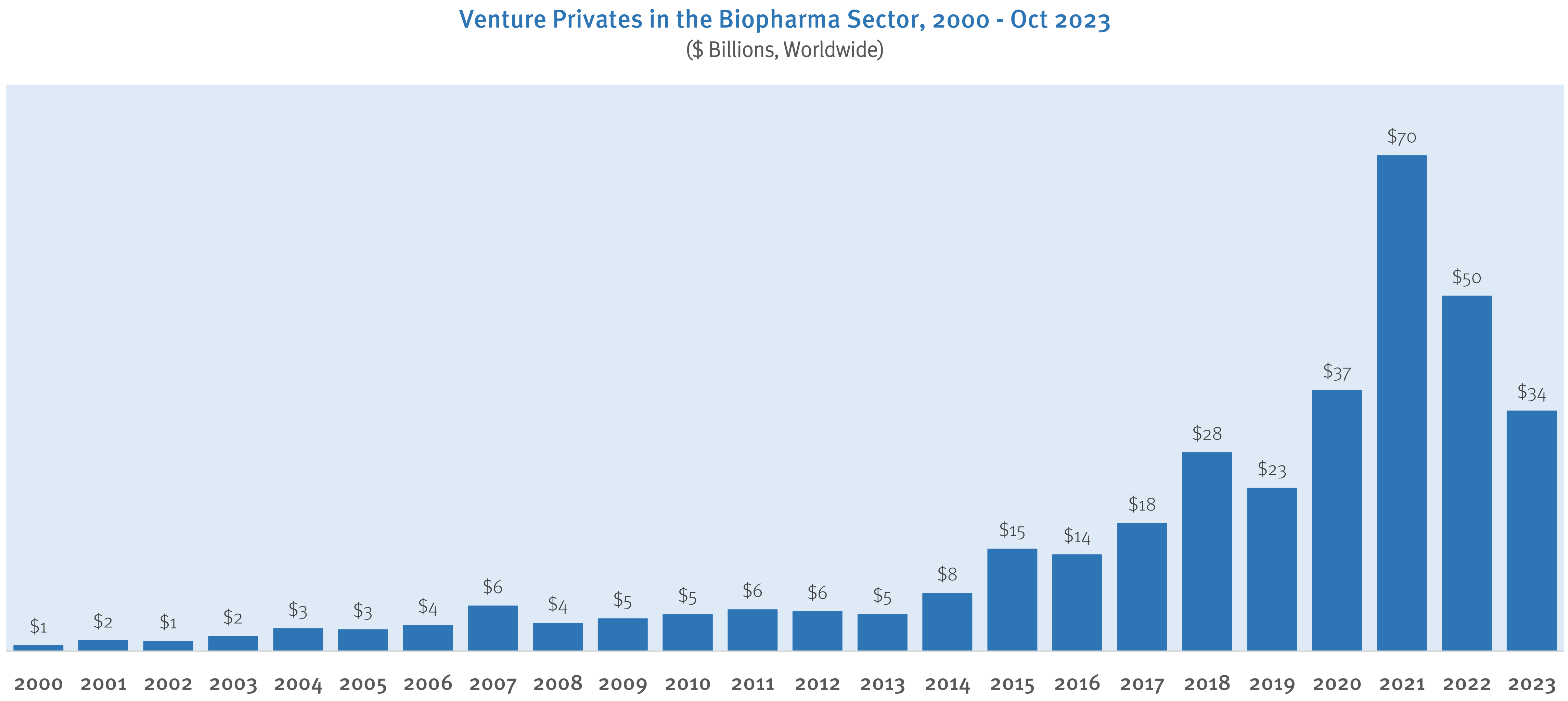
Monthly BioPharma Private Equity / Venture Placement Volume Softened in the Second Half of 2023

The dollar volume of private deals shrunk as 2023 progressed. This was a reflection more of uncertainty regarding market conditions than lack of funding in venture equity providers.



Source: Stifel internal database, CapIQ, Crunchbase

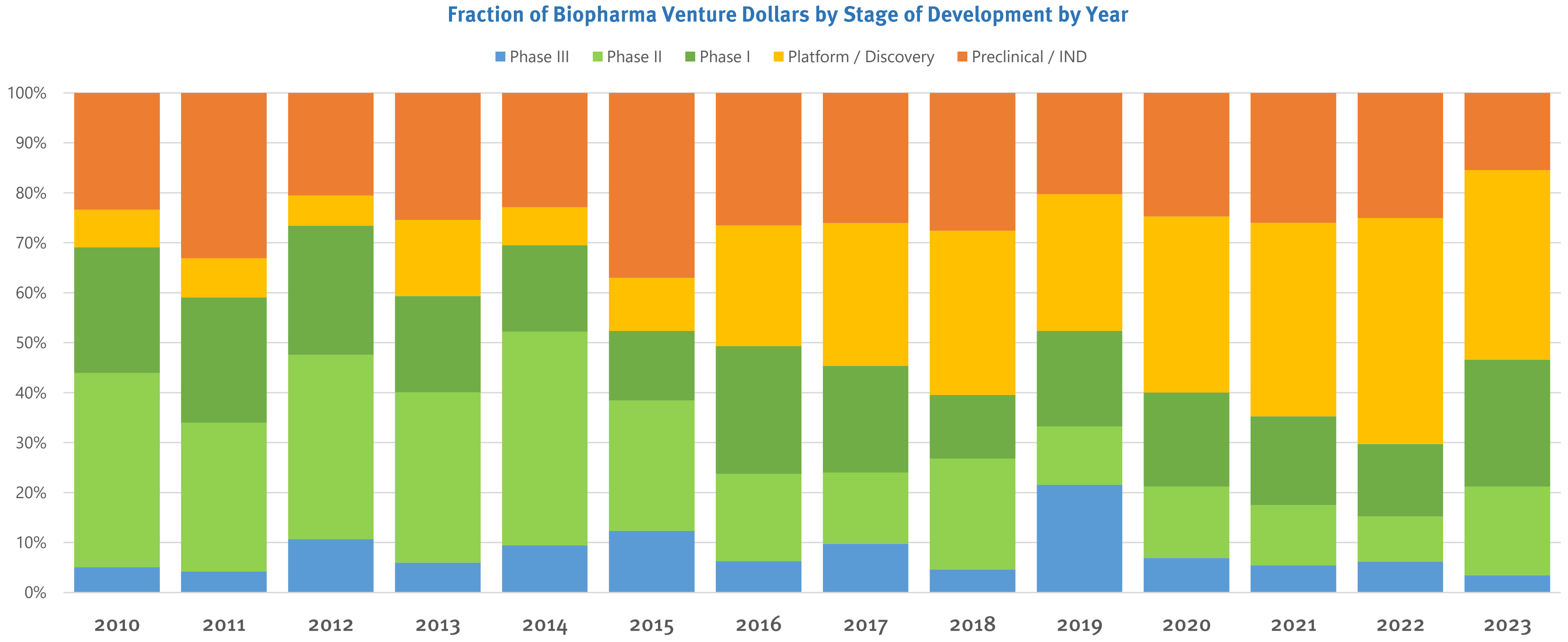
Biopharma Sector Venture Equity Deals Total Volume in 2023 Was $34 Billion. Down 32% from 2022.



Source: Stifel internal database, CapIQ, Crunchbase

We Saw More Late-Stage Venture Investments in 2023

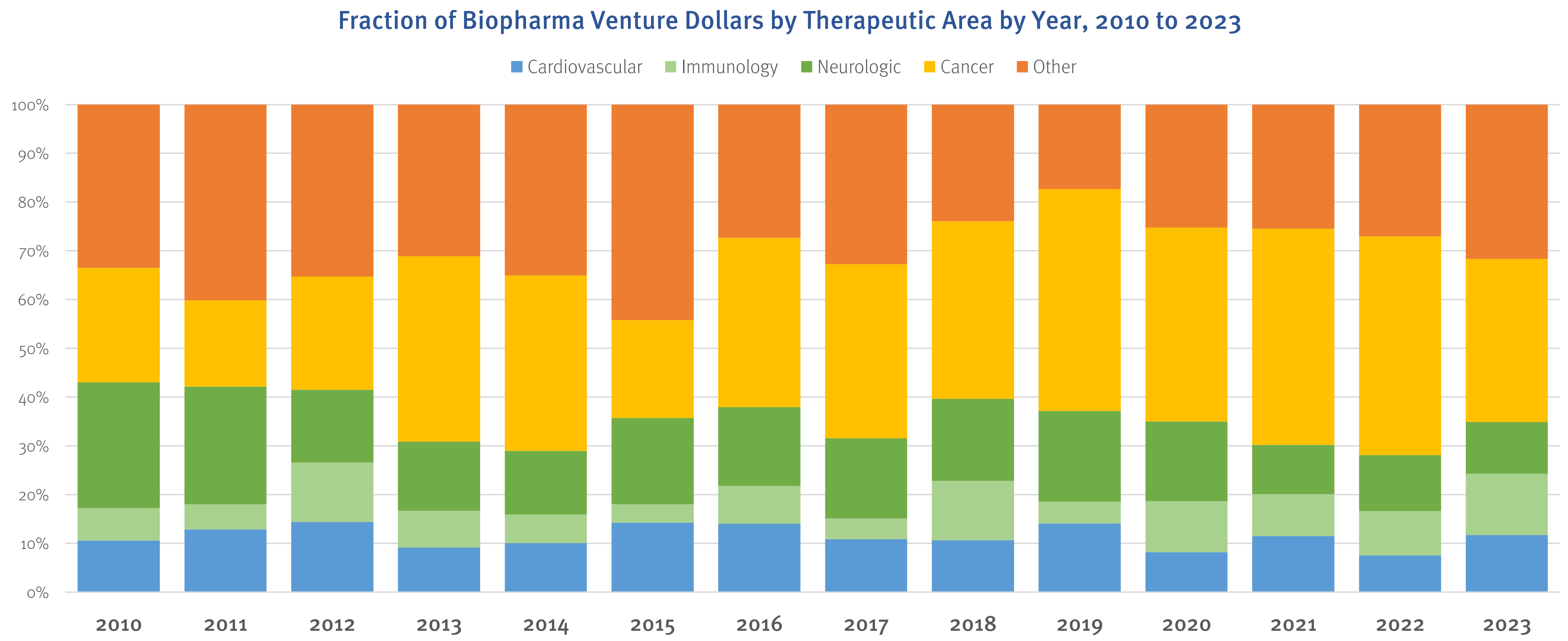
The share of venture dollars invested in later stage molecules went up in 2023. However, over a longer period, we saw distinctly less late-stage investments after 2019 (presumably because these companies could go public). Platform investment levels fell slightly in 2023. However, over the long-term, the popularity of investing in platform companies is a relatively new thing, taking off in a meaningful way only in 2016 – and peaking last year when over 45% of all venture dollars went into discovery stage deals and platforms.



Source: DealForma. Venture investments into the biopharma sector. Data for 2023 through June 30th.

Immunology Investment Area Up / Oncology Down in 2023

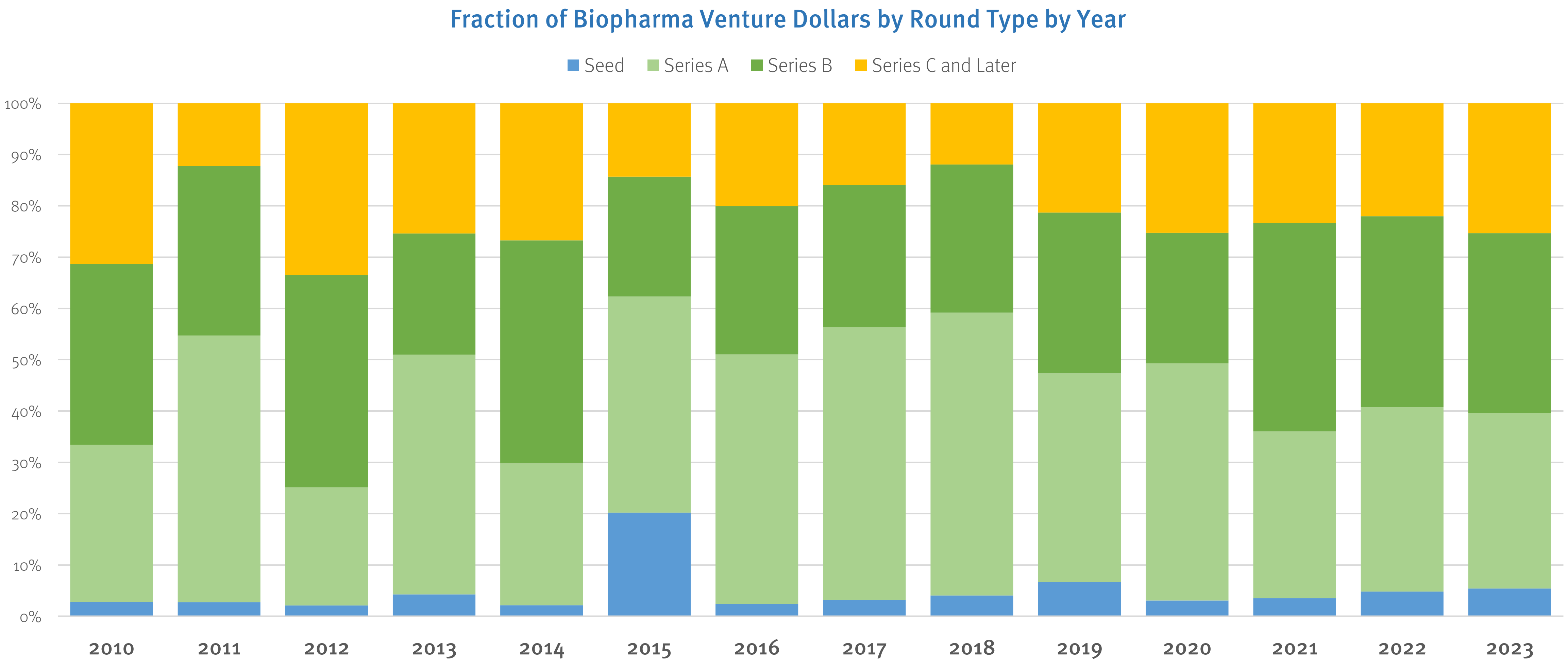
We have seen venture investments into oncology companies shrink big in 2023. Investments into immunology and CVM companies rose in 2023.



Source: DealForma. Venture investments into the biopharma sector. Data for 2023 through June 30th. Immunology encompasses investments in autoimmune and inflammation.

Fewer Earlier Stage Rounds Relative to Late-Stage Deals in 2023

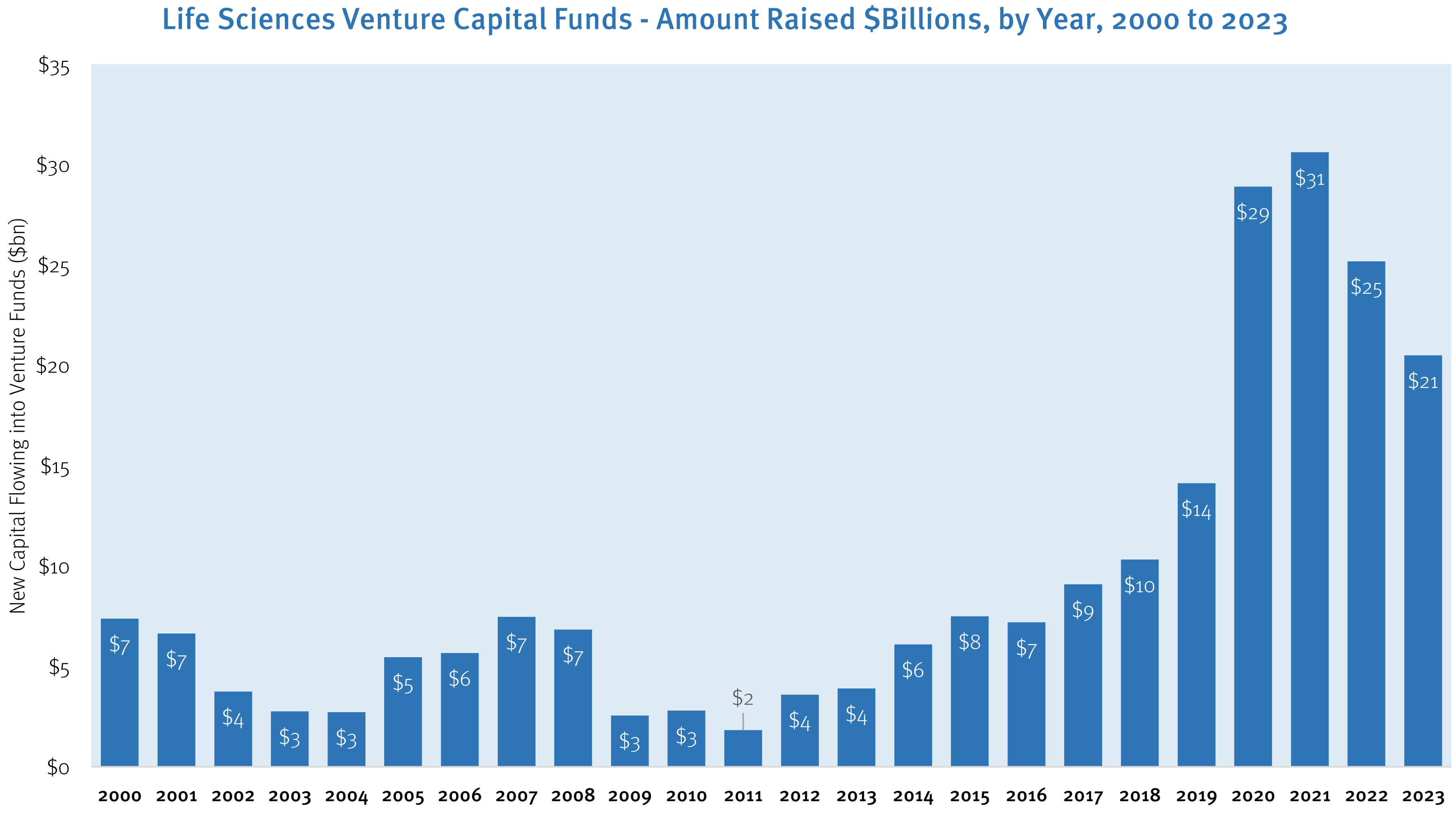
The share of money going into Series Seed, Series A and Series B deals went down in 2023. In contrast, Series C and later rounds saw more activity in 2023 versus earlier years.



Source: DealForma. Venture investments into the biopharma sector. Data for 2023 through June 30th.

Venture Funds Capital Raising

New Capital Flows into Life Sciences Venture Funds Down in 2023 But Still Historically Strong



The total volume of new money flowing into life sciences venture funds was $21.5 billion in 2003. This makes 2003 the fourth largest year in venture fundraising for our industry.

Not bad given how poor market conditions were in 2023.

Overall, venture fund capital raising took a major step up starting in 2020 and has not reverted.

Source: Stifel internal database of fund announcements and Form D's for various funds.

Total Dollars Raised for Biopharma Venture Funds in 2023

$21.5 Billion

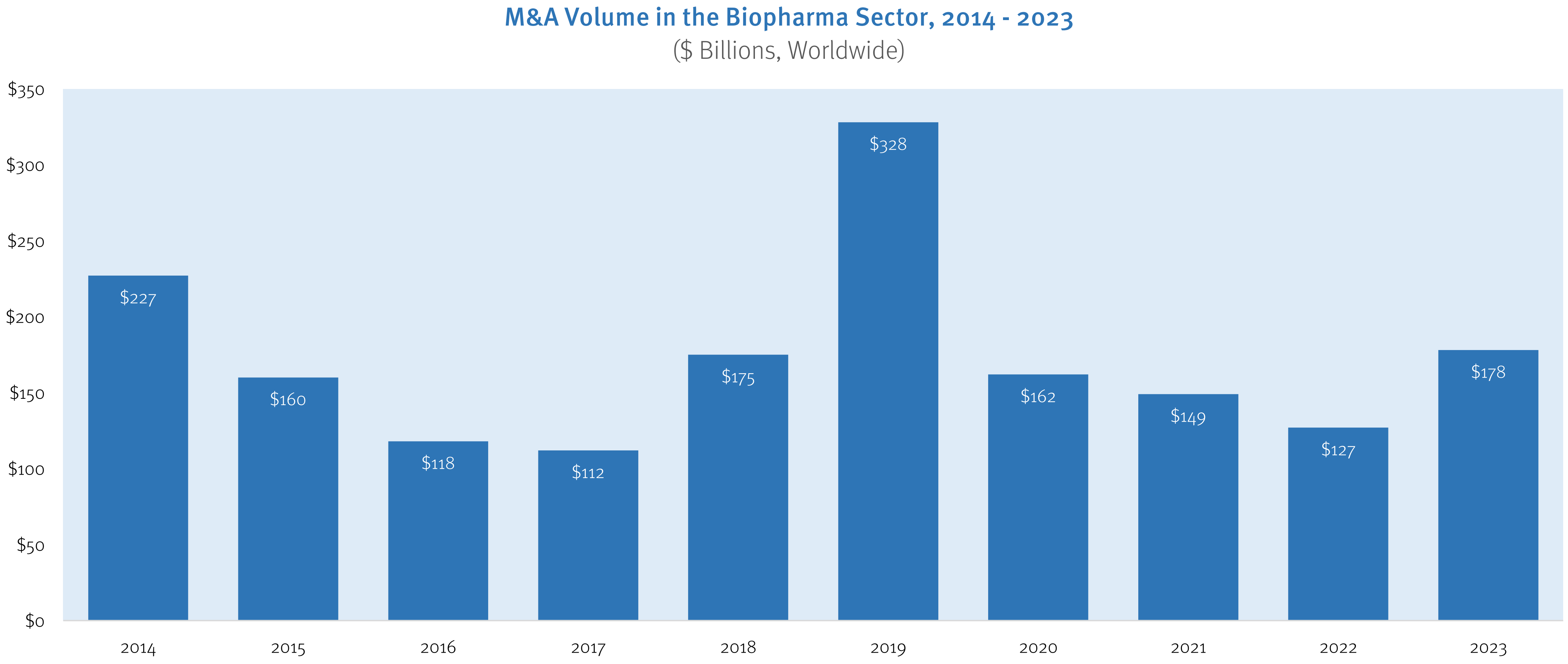
Flowed into 41 different biopharma venture funds in 2023.

The fund world is clearly open for business.

Source: Stifel healthcare venture fund tracker database.

M&A and Licensing Environment

We Saw $178 Billion in Biopharma M&A in 2023 – The Busiest Since 2019

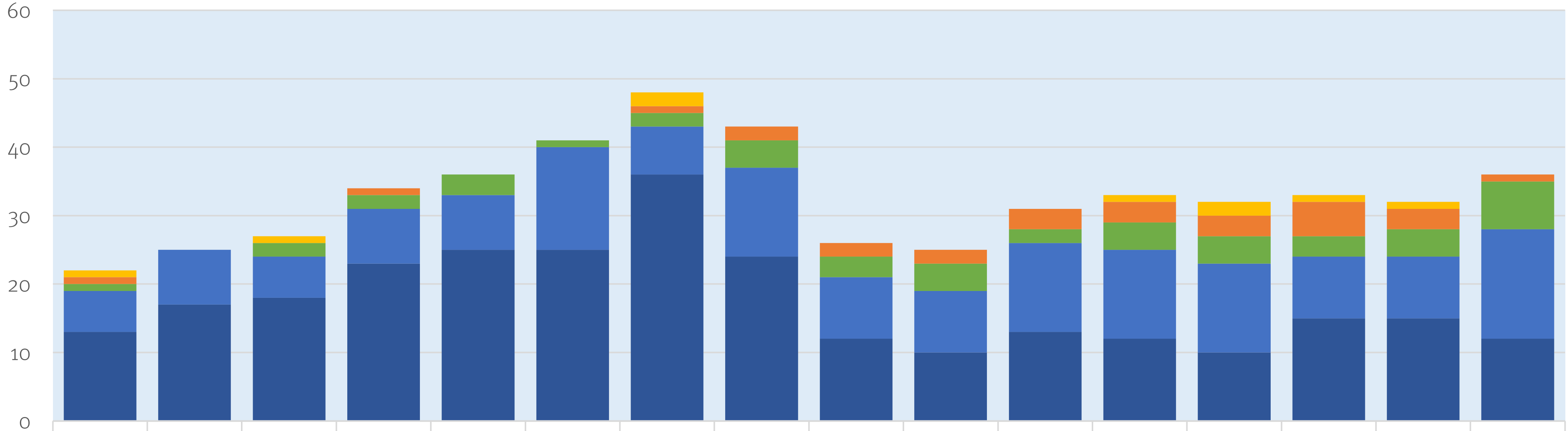


Source: S&P CapitalIQ and Stifel research. This includes all reported global therapeutics change of control transactions and included asset sales such as the Novartis Xiidra divestiture. Includes reverse mergers at equity value and transactions in human/animal health. Does not include SPAC mergers nor mergers in pharmaceutical services and non-therapeutic fields.

We Saw A Significant Increase in Clinical Stage Versus Preclinical M&A Deals in 2024

In 2023 64% of M&A deals were for companies with clinical stage assets (Phase 1 to Phase 3). Compare this to an average of 45% in the 2019 to 2022 period. The fraction of M&A deals for approved assets is down as is the fraction of deals for platforms and preclinical assets.

Number of Biopharma M&A Deals ($100mm+) by Stage of Target Company, 2008 to 2023

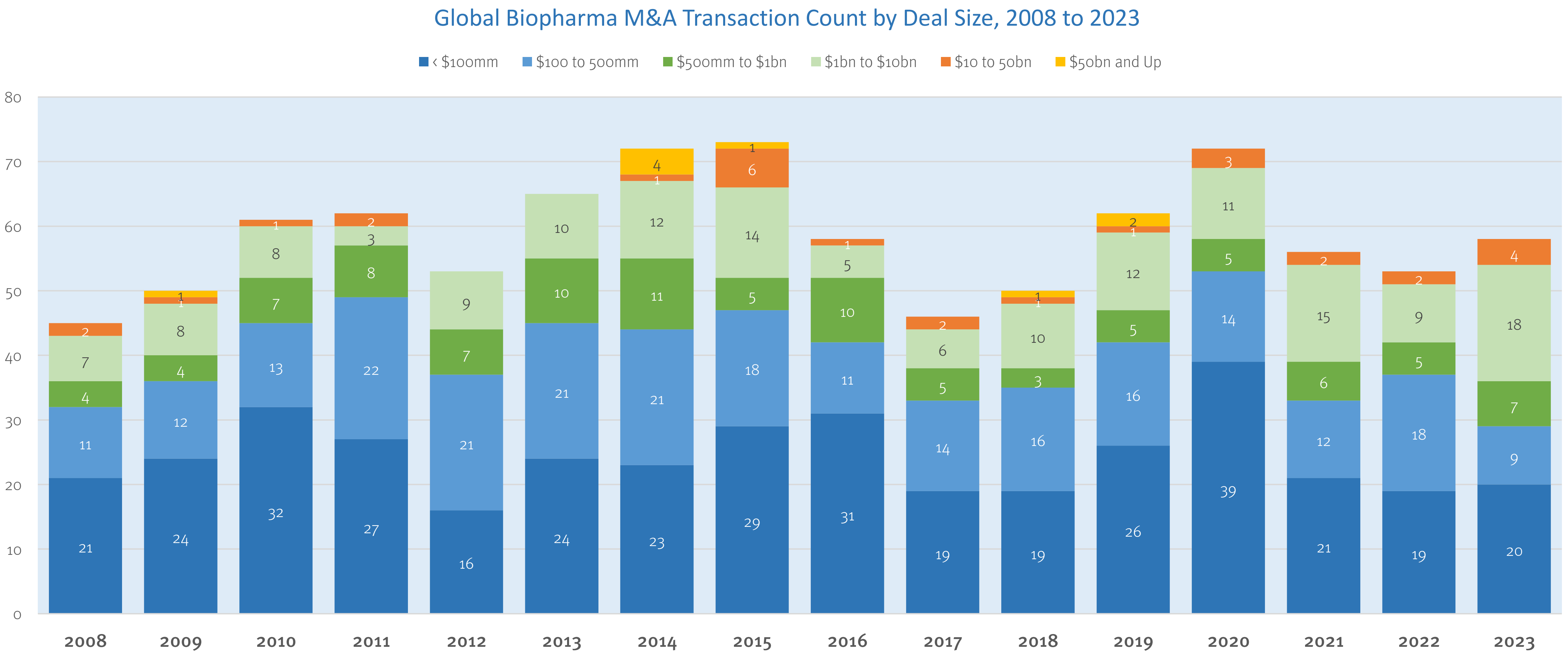


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Platform	1		1				2					1	2	1	1	
Preclinical / IND	1			1			1	2	2	2	3	3	3	5	3	1
Phase I	1		2	2	3	1	2	4	3	4	2	4	4	3	4	7
Phase II/III	6	8	6	8	8	15	7	13	9	9	13	13	13	9	9	16
Commercial	13	17	18	23	25	25	36	24	12	10	13	12	10	15	15	12

Source: DealForma. Only included therapeutics M&A deals with upfront payments (cash or equity) valued at $100mm or more. Reverse merger / SPAC deals excluded.

Robust M&A Volume in 2023 in All Size Categories Except Mega-Deals

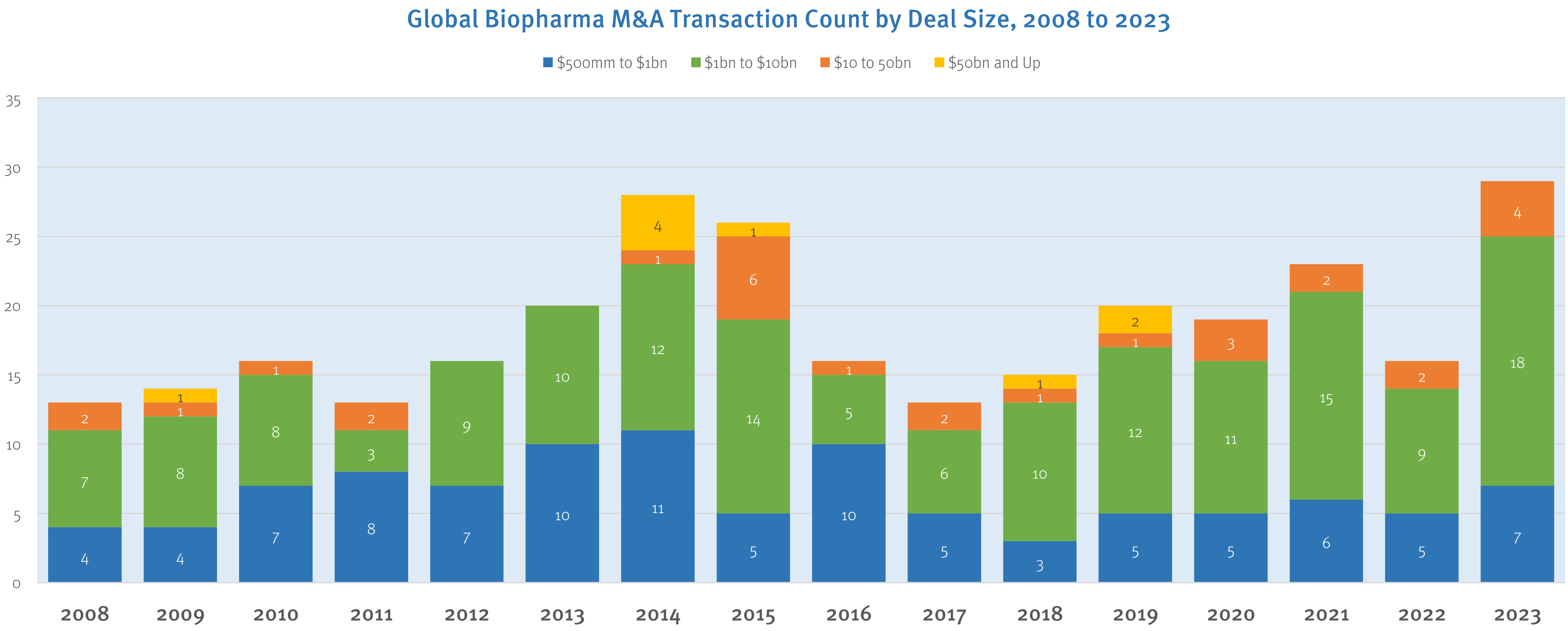
M&A activity was quite strong in all size categories in 2023 except for mega-deals ($50bn and up) which were effectively prohibited by the FTC.



Source: DealForma. Reverse merger / SPAC deals excluded.

We Saw 22 Deals in 2023 that Were for $1 Billion or More, Surpassing the Previous Record Set in 2014

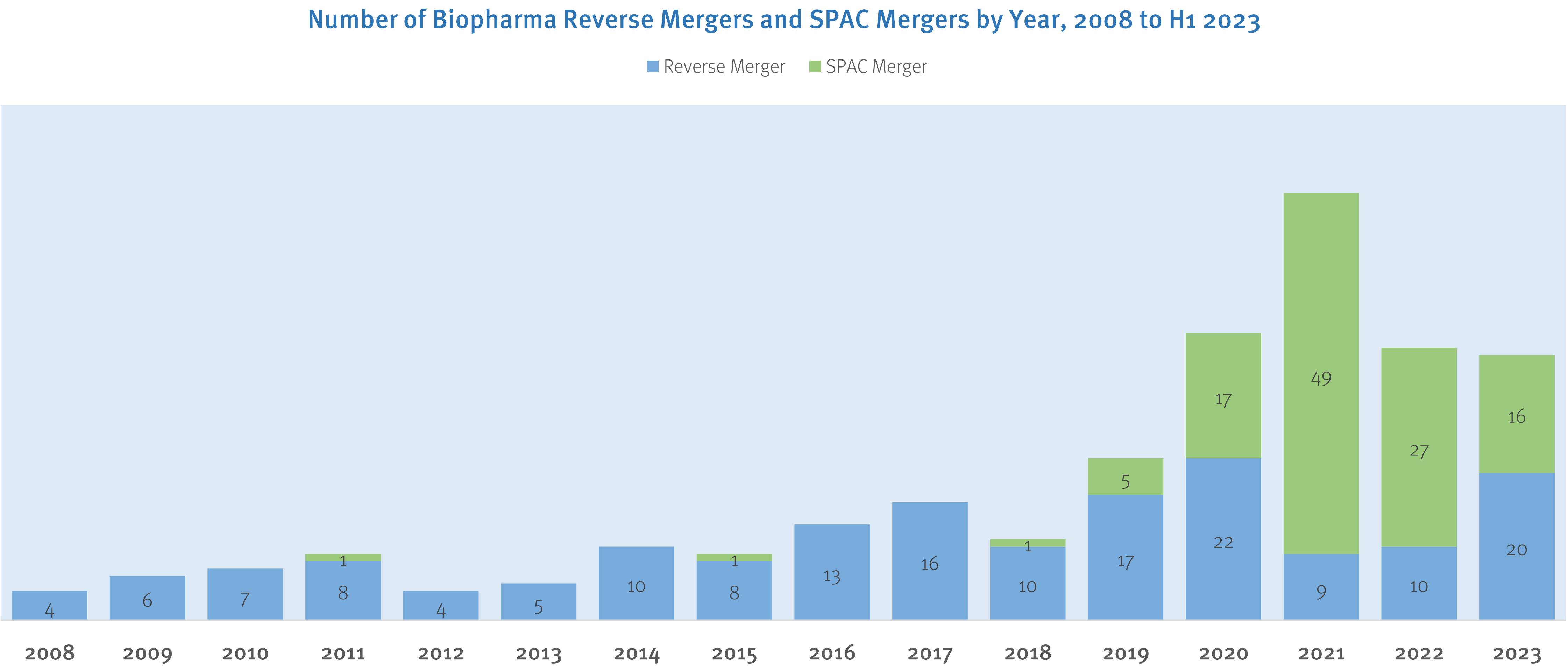
We saw 18 M&A transactions in the $1bn to $10bn size category in 2023. This surpassed an all-time record with the effect that 2023 was the most active year in biopharma history for M&A deals of $1bn or more.



Source: DealForma. Only included therapeutics M&A deals with upfront payments (cash or equity) valued at $100mm or more. Reverse merger / SPAC deals excluded.

Reverse Mergers and SPAC Deals Remained Important

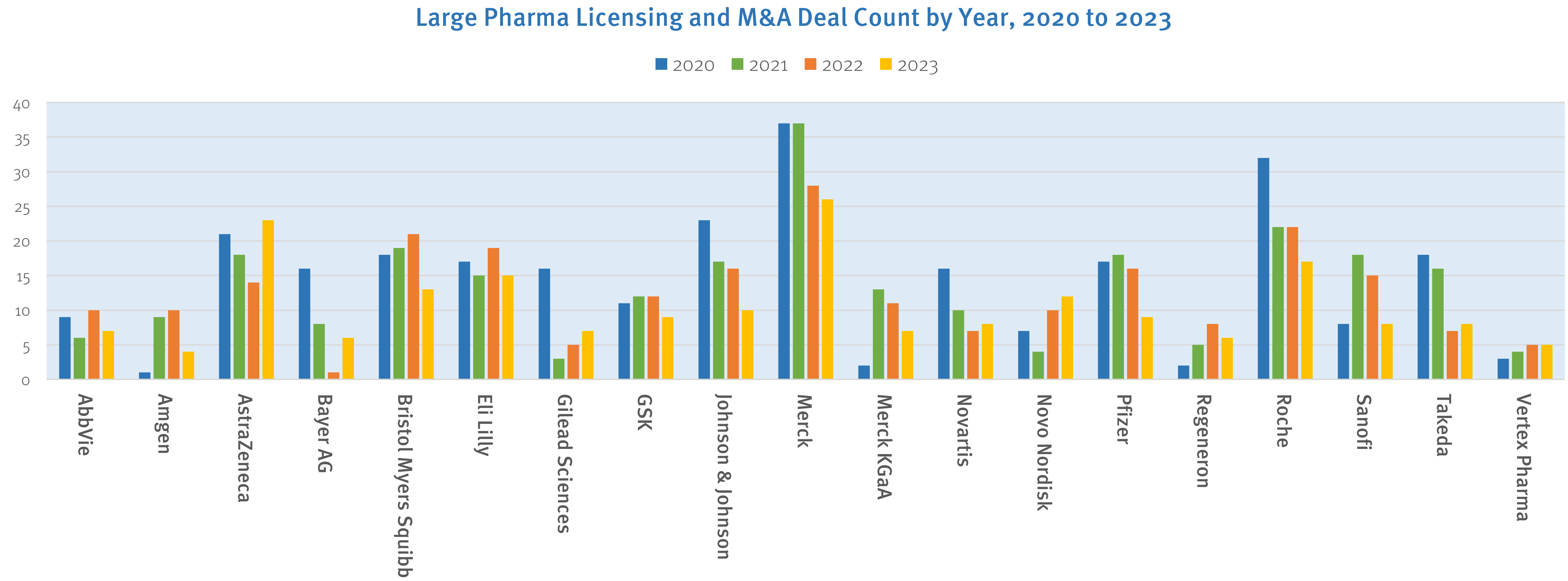
The availability of reverse mergers and SPAC deals as a way of going public has been responsible for 131 biopharma companies entering the public markets since 2021 without going through the traditionally underwritten IPO process.



Source: DealForma. Data for 2023 are through June 30th.

Most Active Big Pharma Dealmakers Since 2020

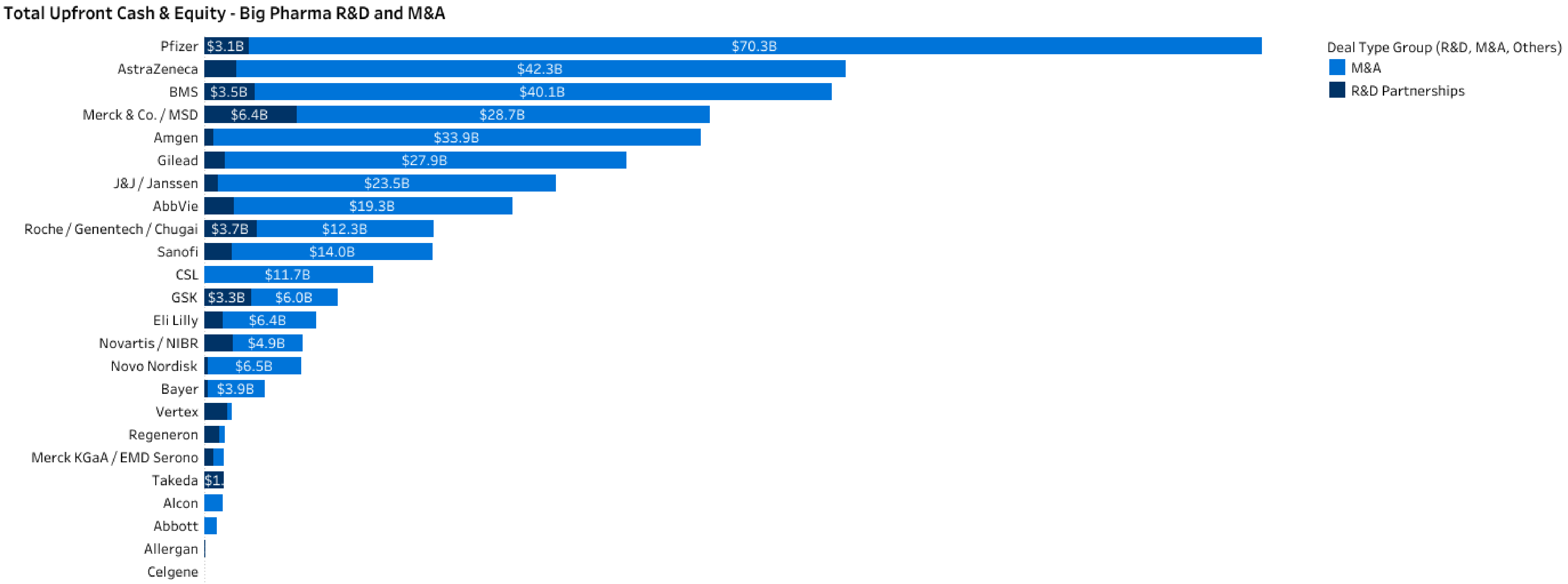
The most active dealmakers over the last three years have been Merck, Roche and AstraZeneca. Merck and Roche slowed their deal pace in 2023 while AstraZeneca's activity level picked up. An important context is that there was little M&A during the Pandemic for social-political reasons. So, most big pharmas were highly active on the licensing front –particularly in the search for technologies and assets that would be of value against the SARS-Cov2 virus. As M&A picked up last year, licensing dollars were pressured downward in many companies – hence the appearance of less overall deal activity by many in 2023.



Source: DealForma. Data for Jan 1, 2020 to Dec 29, 2023

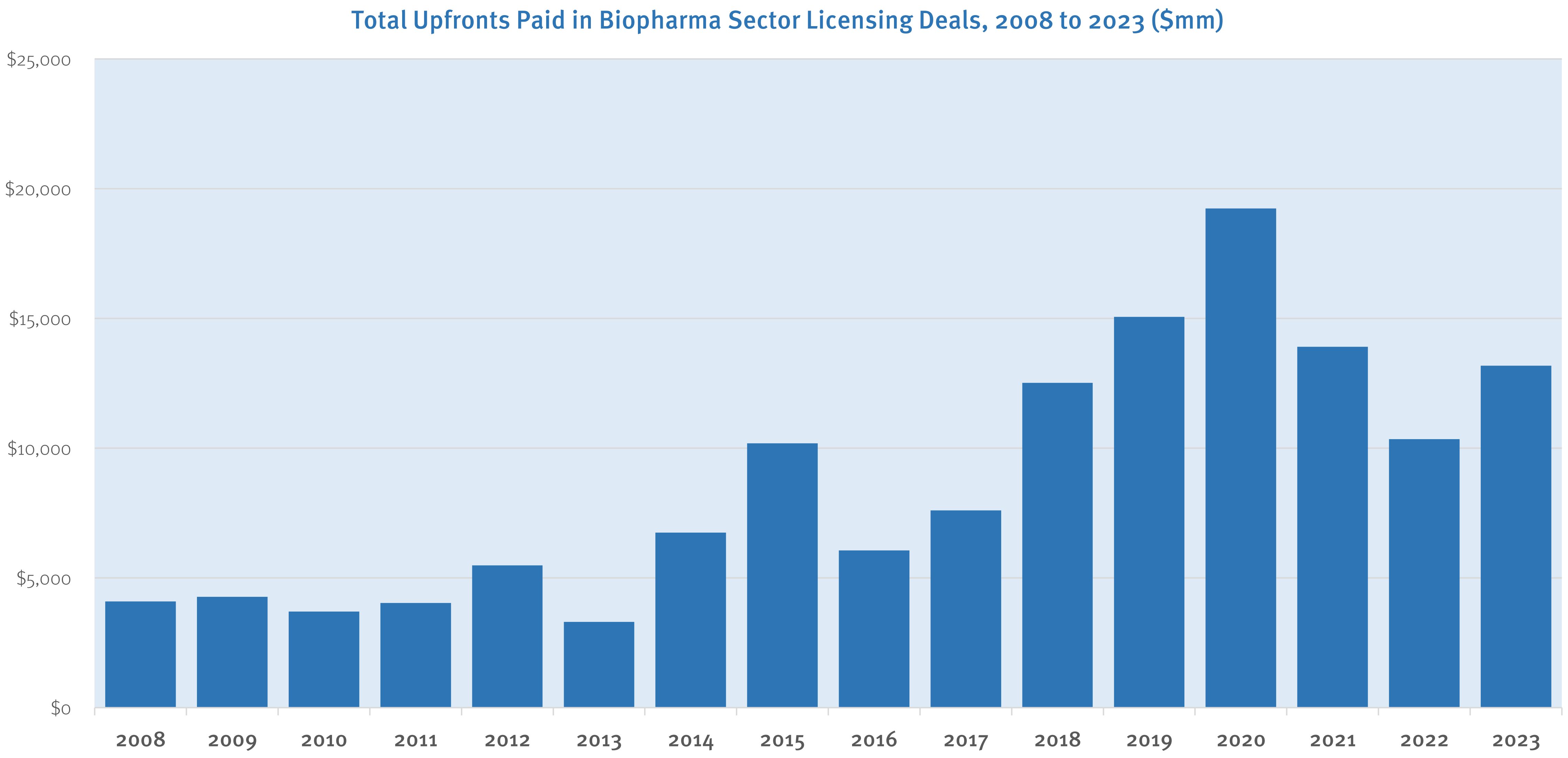
Biggest Spenders on Pharma Deals (Upfront Payments)

The most active dealmakers in terms of dollars spent over the last three years have been Pfizer, AstraZeneca and BMS. The least active players in dollar terms have been Bayer, Vertex, Regeneron, Merck KGaA, Takeda and Alcon.



Source: DealForma. Data for Jan 1, 2020 to Dec 29, 2023

Licensing Volume Up from 2022 But Not Near Record Level of 2020

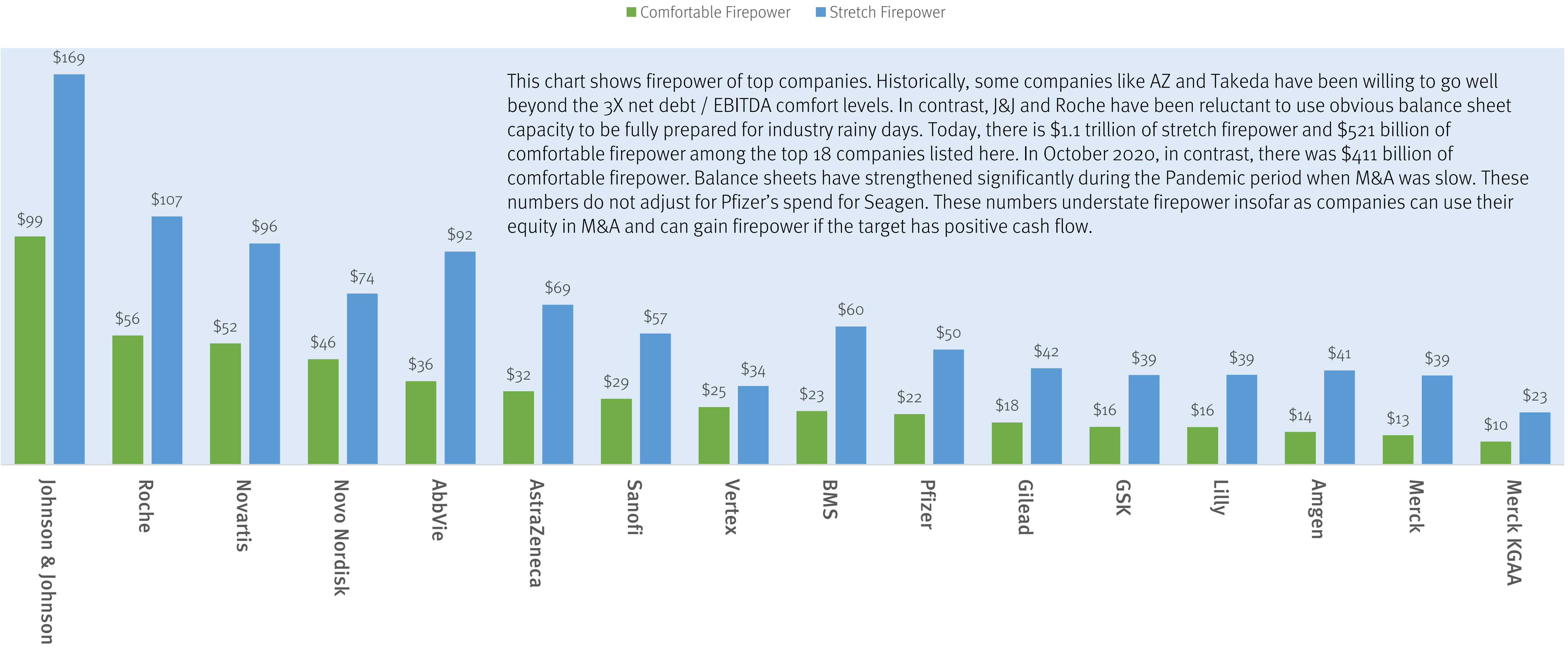


Source: DealForma

Over $500 Billion of M&A Firepower at Top 16 Pharmas

We define comfortable firepower as the amount of debt a company can take on given current EBITDA to arrive at a ratio of net debt to EBITDA of three times. Stretched firepower would take a company to a ratio of net debt / EBITDA of five times.

M&A Firepower of Top 16 Pharmas, November 2023 ($ Billions)



Source: S&P, CapitalIQ

Predictions of What We Expect in M&A in 2024

- High M&A volume in novel therapeutics for **cardiometabolic disease:**
  - —Continuing trends from 2023
  - —Big areas are obesity, heart failure, liver disease, insulin resistance
  - —High interest in small molecules, orals, antibodies, peptides and nucleic acid therapies
  - —In liver disease the focus is on disease modifying therapies that go beyond lipid control

- High M&A continued volume in novel therapeutics for **immunology:**
  - —Highest interest in B-cells, FcRn, eosinophils, T-cell system
  - —Focus highest on first-in-class or early-in-class targets

- High M&A volume in **targeted oncology** likely:
  - —ADC's (particularly companies with novel targets and differentiated platforms)
  - —Radiopharmaceuticals (particularly companies with manufacturing solutions)
  - —Hard targets and precision oncology
  - —Anything with exceptional efficacy in an area of unmet need.
  - —Limited interest in IO antibodies, biologics and cell therapies – these need to past the POC point to garner high interest.

- Medium M&A volume in novel therapeutics for **genetic disease, psychiatry** and **neurologic disease** expected
  - —High interest in novel therapies for neurologic disease
  - —Perennial interest in breakthroughs in diseases like Huntington's and Parkinson's
  - —Key modalities include gene therapy, RNAi, mRNA, protein degradation
  - —Solid volume in novel therapeutics in areas such as eye, psychiatry, endocrinology, kidney and pain
  - —Late-stage assets with differentiation and outstanding efficacy against real medical need always in demand.

M&A interest is expected to be highest in cardiometabolic disease, immunology, oncology, genetic disease and neurologic diseases. Buyers have a strong preference for differentiated, late-stage assets with long-term exclusivity potential. Key limiting factors related to limited exclusivity of some agents in biotech or limited differentiation from generic competition or the standard of care.

What We Expect to See in 2024 by Pharma Company

12

pharmas expected to have "high" or "very high" M&A appetite in 2024.

Firm	Market Cap ($bn)	Comfortable Firepower ($bn)	Expected M&A Level in 2024	Key Focus Areas	Key Driver of M&A	Size Appetite	Stage
Eli Lilly	$538	$16	High	CVM, Oncology, Neuro, Gene	Long-Term Growth	$1bn to $10bn	Clinical
Novo Nordisk	$442	$46	High	CVM, Endocrinology, Rare	Diabetes/obesity needs	$100mm to $3bn	All Stages
Johnson & Johnson	$354	$99	Very High	Oncology, Immuno, Neuro, CVM	Multiple LOE's	$100mm to $50bn	Clinical
Merck	$257	$13	High	Oncology, CVM, Imm, Neuro	Keytruda LOE	$1bn to $10bn	Clinical
AbbVie	$245	$36	Medium	Immunology, Oncology, Aesthetics	Build imm & oncology	$100mm to $30bn	Clinical
Roche	$211	$56	Medium	Oncology, CVM, Neuro, Imm, Rare	Recharge Growth	$100mm to $3bn	All Stages
AstraZeneca	$191	$32	High	Oncology, CVM, Immunology, Rare	Long-Term Growth	$100mm to $30bn	Clinical
Novartis	$191	$52	Very High	Oncology, CVM, Immunology, Heme	Entresto, Cosentyx LOEs	$100mm to $30bn	Mid to Late
Pfizer	$166	$22	Medium	Immunology, Oncology, Metabolic	Multiple LOE's	$100mm to $3bn	Late Stage
Amgen	$143	$14	High	Oncology, Immunology, CVM, PCP	Prolia, Otezla LOEs	$100mm to $20bn	Clinical
Boehringer Ingelheim	$120	$25	Low	Oncology, CNS	Long-Term Growth	$100 to $500mm	Early Stage
Sanofi	$114	$29	Very High	Immunology, Oncology, Vaccines	Recharge Growth	$100mm to $20bn	Late Stage
Bristol-Myers Squibb	$103	$23	Very High	Oncology, Heme, Immunology, CVM	Eliquis LOE/IRA	$100mm to $30bn	All Stages
Vertex Pharma	$96	$25	Medium	Genetic Medicine, CNS	Disease Innovation	$100mm to $3bn	All Stages
Gilead Sciences	$95	$18	High	Oncology, Virology, Immunology	Oncology Ambitions	$100mm to $10bn	Clinical
Regeneron	$85	$22	Low	Oncology, CVM	Great Values	$100mm to $1bn	Early Stage
Merck KGaA	$69	$10	Medium	Oncology, Immunology	Pharma Critical Mass	$100mm to $3bn	All Stages
GSK	$69	$16	High	Oncology, Respiratory, ID, Vaccines	Recharge Growth	$100mm to $10bn	Late Stage
Daiichi Sankyo	$52	$7	Medium	Oncology, White Space	Long-Term Growth	$100mm to $4bn	All Stages
Takeda	$43	None	Medium	Oncology	Oncology LOEs	$100mm to $1bn	All Stages
Bayer	$42	None	Low	Oncology, CVM, New Modalities	Pharma Critical Mass	$100 to $500mm	All Stages
Sun Pharma	$34	$6	Medium	Dermatology, Ophtha, White Space	Branded Business Build	$100mm to $2bn	Late Stage
Biogen	$33	$2	Medium	Immunology, Rare, Neuro	Rebuild Growth Story	$100mm to $2bn	Clinical
Astellas	$21	$2	Medium	Immune-Oncology, Ophtha	Xtandi LOE	$100mm to $3bn	Mid to Late
Otsuka	$20	$10	High	Neuro, Nephrology, Rare	Build R&D Capacity	$100mm to $3bn	All Stages

Source: Stifel IB analysis

Some Areas of Pharma Interest in Early-Stage Innovation

1. Strong view that generative AI can help with drug discovery. NVIDIA partnerships with Genentech and Recursion are examples.
2. Very aggressive pursuit of emerging targets in heart failure.
3. A sense that we aren't done with orals in the TNF-a, IL-17, IL-23 pathway.
4. Extremely high interest in B-cell biology, particularly emerging work on IgG degraders, FCg2rA FCg2rB.
5. Strong interest in innate immune targets, particularly small molecules in the inflammasome in the clinic.
6. Focus on frontline stories in cancer, particularly lung, breast, prostate and CRC.
7. Very high interest in non-viral delivery of gene therapies and nucleic acid payloads to tissues beyond the liver.
8. Very high focus on ADCs and ADCs+immune engagers.
9. Highly innovative bispecifics with data are still of interest but, in general, immune cell engagers are not as popular today than a few years ago.
10. High interest in iPSCs/cell therapy and neurodegeneration (like Bluerock)
11. Sense that COPD still have plenty of room for innovation.
12. Emerging areas such as aging, autophagy, bioelectronics, mitochondrial disease only drawing modest interest.

Some Emerging Private Company Technologies of Interest

1. **In vivo drug discovery** – This approach tracks analytes directly in cells to figure out what a drug can do. Vastly more powerful than *in vitro* analysis. Eikon Therapeutics really cool. Uses super-resolution microscopy at scale, automation and AI to determine what drugs do to putative targets within cells. Also of high interest is Manifold Bio which uses protein barcoding to facilitate *in vivo* drug discovery. This approach could be game changing.
2. **Work on FcRn and Fc Gamma receptors** – Inhibition or agonism of specific Fc Gamma classes can profoundly impact immune system outcomes. Companies of particular interest include Imunity (CD32a bispecifics), Nuvig (CD32b constructs) and Seismic (CD32b bispecifics).
3. **Extracellular IgG degraders** – Potential to ablate proteins and structures far better than antibodies can. Very interesting work being done with ASPGR degraders at Avilar and Lycia. Can achieve far better ablation of IgG than can be done with FcRn antagonists. Also, large potential to ablate specific pathologic IgG.
4. **Novel RNA therapeutics**– Very exciting opportunities today in RNA delivery, RNA editing and new formats such as circular RNA. Key companies of interest include Exsilio, Nutcracker Therapeutics, Orbital Therapeutics and ReNaGade.
5. **Molecular Condensates** – Condensates are compartmentalized biomolecules which are not enclosed by membranes. Condensates play roles in diverse cellular processes, are dysfunctional in many diseases, and are often enriched in classically “undruggable” targets. Condensates involved in a number of complex diseases and cancers. Very interesting work in this area at Dewpoint Therapeutics and Nuage Therapeutics.

Some Emerging Scientific Areas that We Are Tracking

1. Work on endothelial barrier function at Boston Children's (Tim Hla and colleagues)

   - in cardio and the eye, endothelial health is the missing "third dimension" and is druggable

2. Richard Frye's work on autism

   - has spent a career showing how to parse and treat autism. Gigantic untapped market.

3. Kojin's work on ferroptosis-sensitive cell states and cancer

   - getting near clinic with a drug concept. Applications well beyond cancer.

4. Yutaka Kondo's work on endometriosis, TGFb and Transgelin at Nagoya University

   - New pub in STM suggests a solution for a disease that wrecks the lives of countless women

5. Vincent Marion's work on insulin sensitivity and PKC alpha at INSERM

   - emerging view that insulin sensitivity is the main cause of chronic disease – not obesity

   - and it's druggable

6. David Perlmutter's work on autophagy and Huntington's at Wash U.

   - persuasive evidence that Huntington's damage is linked to lack of autophagy

2024 Predictions for Biotech M&As

Karen Fischer, *Biospace*, Jan 3, 2024 (excerpt)

Continued fallout from the IRA, heightened antitrust enforcement and the rise of AI will all shape the first wave of biotech mergers and acquisitions coming this year, experts tell BioSpace.

Last year was economically challenging for households and businesses alike, and biotechs are not immune to the market's fluctuations, with layoffs and culled programs making regular headlines. But according to Adrienne Ellman, an M&A Partner at Hogan Hovells US LLP focusing on biotech transactions in New York City, the industry has thrived over the past year despite the pessimistic undertones.

"The long-standing innovative culture of the biotech industry was alive and well globally in the last five years, even in the face of inflation, rising debt costs [and] geopolitical uncertainty, among other headwinds," she told BioSpace.

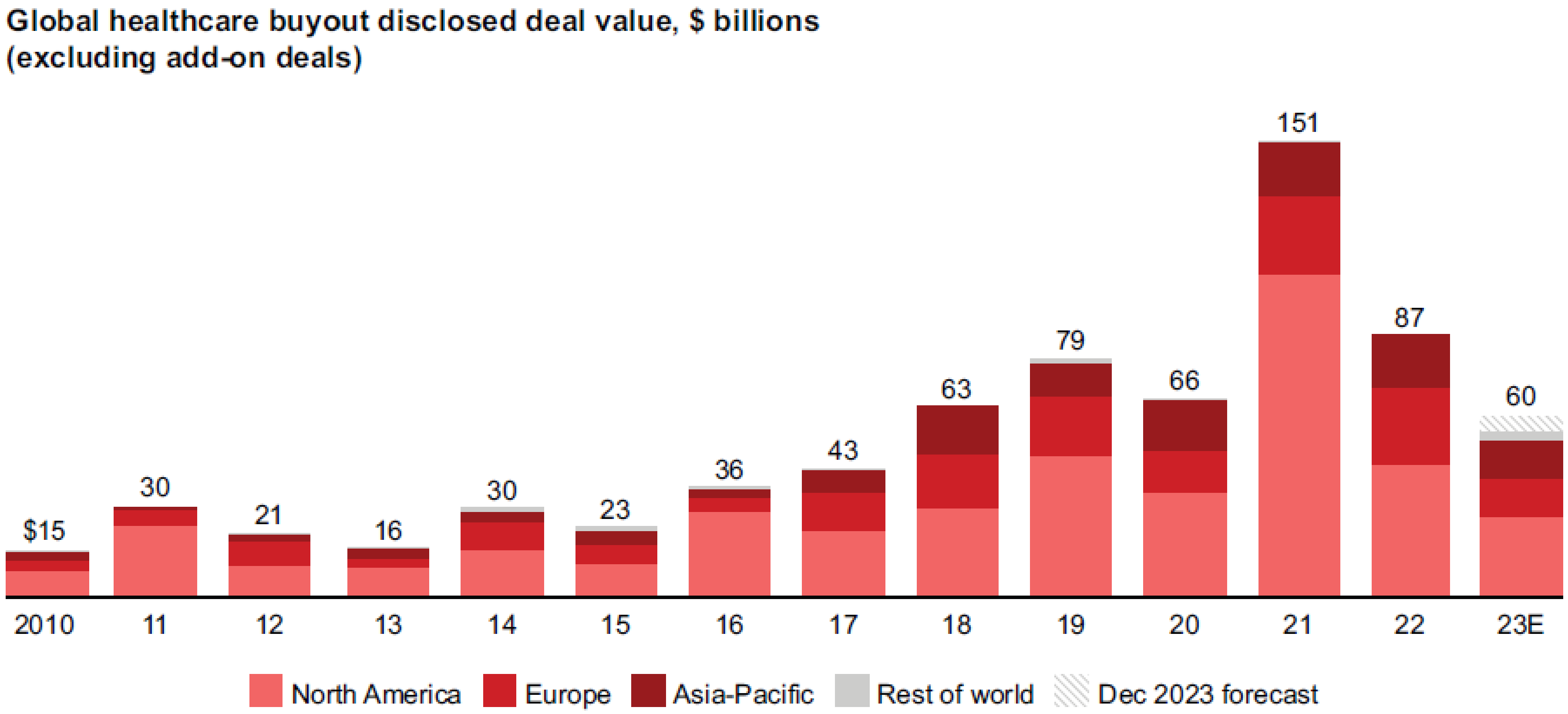
The biopharma industry will continue to see healthy M&A activity in 2024, according to a PwC report, with deals totaling $225 billion to $275 billion.

Ellman predicted that many mergers and acquisitions will follow the same trends that dominated 2023, including deals around gene-edited therapies, immunotherapies and mRNA technology. Karim Aly, CEO of Noze in Montreal, added that he also has his sights set on novel diagnostics and drug delivery systems.

Source: https://www.biospace.com/article/2024-predictions-for-biotech-m-and-as-/

Healthcare PE Deals Declined Significantly in 2023

Bain Report on Private Equity in Healthcare, Jan 3, 2024

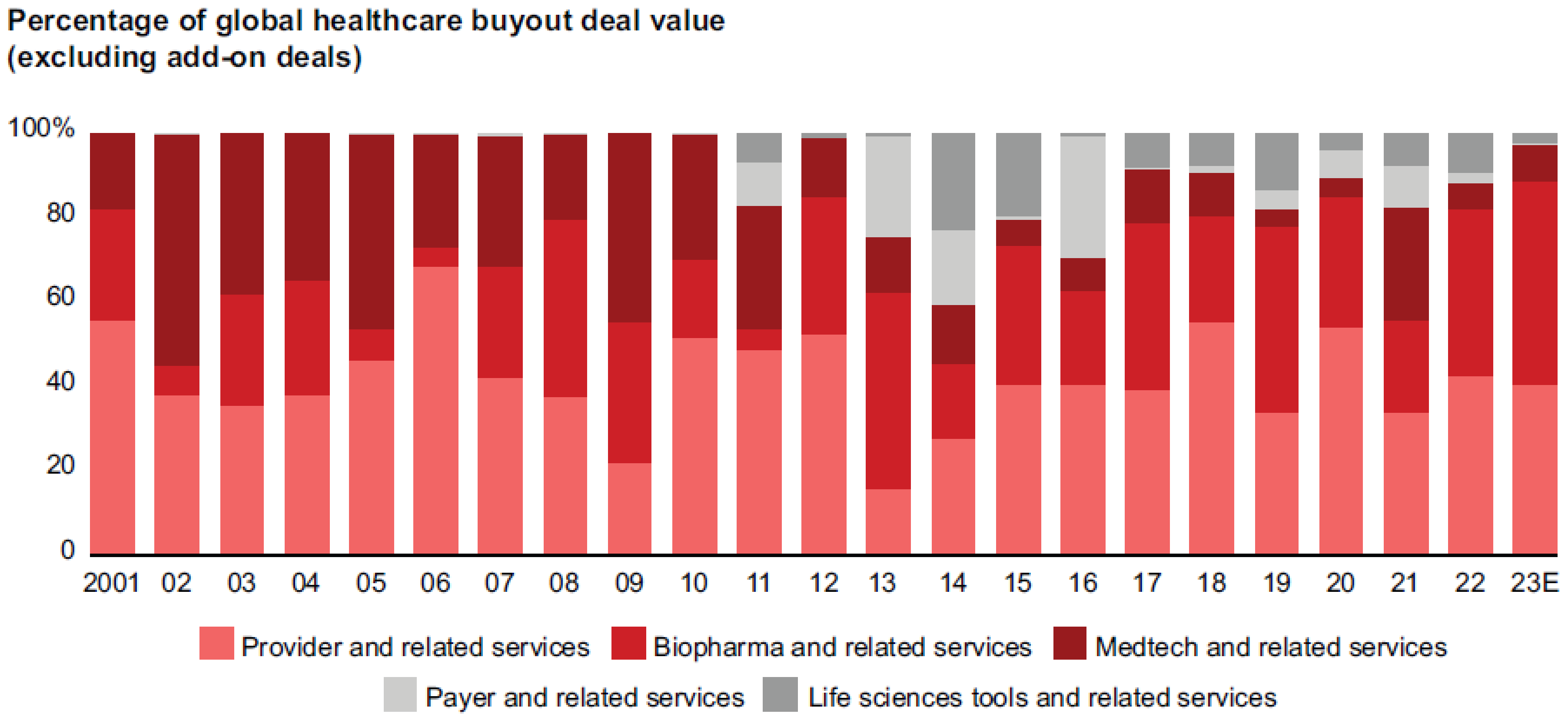


Notes: Excludes spin-offs, add-ons, loan-to-own transactions, special purpose acquisitions, and acquisitions of bankrupt assets; based on announcement date; includes announced deals that are completed or pending, with data subject to change; deal value does not account for deals with undisclosed values; values updated based on Dealogic 2020 sponsor classifications; values include net debt where relevant; 2023E annualized assuming the average ratio of January–November to December from 2019 to 2022, based on data through November 30, 2023
Sources: Dealogic; AVCJ; Bain analysis

Source: https://www.bain.com/insights/topics/global-healthcare-private-equity-report/

Healthcare PE Deals Tilted Towards Biopharma in 2023

Bain Report on Private Equity in Healthcare, Jan 3, 2024



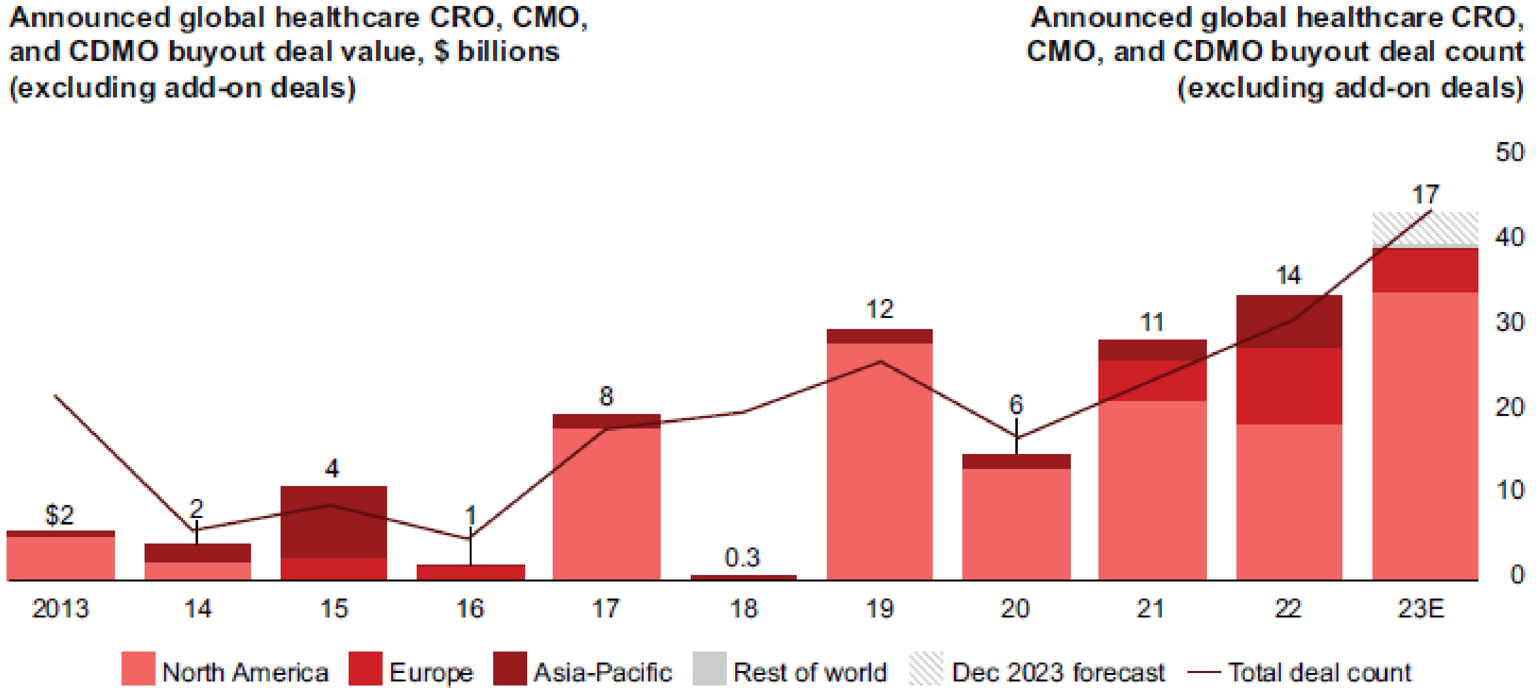
Notes: Excludes spin-offs, add-ons, loan-to-own transactions, special purpose acquisitions, and acquisitions of bankrupt assets; based on announcement date; includes announced deals that are completed or pending, with data subject to change; deal value does not account for deals with undisclosed values; values updated based on Dealogic 2020 sponsor classifications; values include net debt where relevant; 2023E annualized assuming the average ratio of January–November to December from 2019 to 2022, based on data through November 30, 2023; 2010 value includes $1 billion of uncategorized deals
Sources: Dealogic; AVCJ; Bain analysis

Source: https://www.bain.com/insights/topics/global-healthcare-private-equity-report/

Significant Pick up in PE Volume for Pharma Services in 2023

Bain Report on Private Equity in Healthcare, Jan 3, 2024

Figure 3: Outsourced services organizations have become more attractive



Notes: Excludes spin-offs, add-ons, loan-to-own transactions, special purpose acquisitions, and acquisitions of bankrupt assets; based on announcement date; includes announced deals that are completed or pending, with data subject to change; deal value does not account for deals with undisclosed values; values updated based on Dealogic 2020 sponsor classifications; values include net debt where relevant; includes only deals in the life sciences tools and biopharma sectors; 2023E annualized assuming the average ratio of January–November to December from 2019 to 2022, based on data through November 30, 2023
Sources: Dealogic; AVCJ; Bain analysis

Source: https://www.bain.com/insights/topics/global-healthcare-private-equity-report/

Disclosure

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