TPG INSIGHTS

Healthcare: Reset & Rethink

> **If we keep spending this much on healthcare, we're not going to be able to afford so many other important things.**
> *- Seema Verma*

> **There's a tremendous amount of change in healthcare private equity today… And in these moments of change, there's opportunity.**
> *- Katherine Wood*

> **Healthcare is distinct from many other sectors in that the biggest shifts tend to play out over a long period of time. It's an evolution, not a revolution.**
> *- Zach Ferguson*

> **There are so few industries where you can save lives while also driving outsized financial returns. But that's precisely the opportunity in life sciences and biopharma.**
> *- Carolyn Ng*

While the most acute phase of the pandemic has long since receded, its impacts continue to be felt across the economy and society. Of particular importance, it's forced us all to reset and rethink our approaches to healthcare. Add to this growing affordability concerns due to rising cost pressures and healthcare is squarely in focus today. Given this backdrop, we speak with **Seema Verma**, former administrator of the Centers for Medicare and Medicaid Services, and **Katherine Wood**, a Partner in TPG Capital's healthcare group, about the biggest opportunities and risks in the sector. Verma highlights affordability and quality as her main areas of concern, and she argues that value-based care models spurred by private sector innovation have an important role to play in producing improvements on both fronts. For her part, Wood sees the healthcare market at an inflection point, driven by novel care models and new innovations, which she believes raises the level of opportunity for investors and patients. We also sit down with **Zach Ferguson**, a Partner with TPG Growth's healthcare team, and **Shinichiro Fuse**, **Carolyn Ng**, and **Lucian Iancovici**, who lead TPG's Life Sciences Innovations (LSI) efforts, to discuss the fastest growth areas across healthcare. They echo Wood's optimism about the current opportunity set, with Ferguson highlighting the ongoing shift in sites of care and the LSI team a "Golden Age" for life sciences as mega trends that will shape healthcare for decades to come.

IN THIS ISSUE

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TPG INSIGHTS

Interview with Seema Verma

Seema Verma is the **Senior Vice President** and **General Manager** for **Life Sciences at Oracle**. She was the **administrator of the Centers for Medicare and Medicaid Services (CMS)** from 2017-2021, where she oversaw a $1.4T dollar budget and coverage for 145 million beneficiaries, 6,000-plus employees, and over 100,000 contractors. She's also a **board member** of TPG portfolio companies Monogram Health and Lifestance Health. Below, she provides her perspective on the biggest challenges and opportunities in healthcare and healthcare policy, the future of value-based care, and how AI will impact medicine.

The views stated herein are those of the interviewee and do not necessarily reflect those of TPG.

Q: What are the biggest issues in healthcare policy right now?

Seema Verma: Affordability is number one. The reality is that the current pace of healthcare spending in the US simply isn't sustainable. Every so often, this comes up in the context of Medicare where the trustees come out and say the system is running out of money and policymakers need to put together a plan to fix things.

There are some signs that Medicare spending is starting to slow as a result of recent CMS actions, including our big focus on promoting competition, policies around site neutral payments, increased value-based care, and other payment policies. But despite these seemingly positive signs, there's still going to come a point, in my view, where we're going to be forced to trim payments by 10-20% for the system to continue to run.

Beyond Medicare, there are broader affordability challenges across all parts of US healthcare. This year saw a sharp rise in the cost of employer coverage, and many private surveys suggest the trend will only continue to worsen in 2024.

The second big thing is the quality of care. We have big workforce challenges because of ongoing labor shortages, which means that people are having a hard time even accessing healthcare today. This is further fueling the burgeoning concierge medicine industry and the focus on delivering care more efficiently and at scale. Hospitals are struggling financially due to workforce and other economic challenges. While there is an active effort to reduce this area of spend, hospitals are the backbone of the healthcare system, and so the diversion of their funding could also contribute to lower-quality care.

Lastly, drug pricing is critically important. We've seen some movement on the policy front in this regard. The Inflation Reduction Act is notable, and we can expect further action by Congress to address Pharmacy Benefit Mangers (PBMs). Drug spending is one of the fastest-growing areas of overall healthcare spend, and we're starting to have more and more blockbuster drugs that are capable of breaking the budget.

The growth of enrollment in Medicare Advantage plans will create more focus on the overall reform of government managed care plans not only in Medicare but also in Medicaid. We can expect more discussion on risk adjustment and the prior authorization practices of health plans more broadly.

Q: Can value-based care address these affordability and quality concerns?

Seema Verma: Yes, it's our best hope. But it's not developing fast enough or effectively enough to move the needle. In general, value-based care models pay providers based on the quality of care they provide. But it's important to distinguish here between the value-based care models being pursued by the public and private sectors.

There was just a thorough report published by the CBO showing that the Center for Medicare and Medicaid Innovation (CMMI), which was created by the Affordable Care Act to test out new healthcare models across Medicare, Medicaid, and the Children's Health Insurance Program, hasn't succeeded in delivering affordability or quality.

There's fundamentally a problem with CMMI's approach. They're not putting out effective models, and that's unfortunately not going to help value-based care because people are going to conflate what CMMI is doing with what's being done by the private sector. There's a lot of belief and hope surrounding value-based care, but it hasn't quite scaled as much as most people would've liked. The only way to a more effective value-based system is to mandate it. Voluntary models simply won't work. But that's a change that's only going to happen at the federal level, which looks very unlikely at the moment. So, we'll continue to see some further movement towards value-based care, though it'll likely be concentrated in pockets where the proper models and incentives exist.

> **If we keep spending this much on healthcare, we're not going to be able to afford so many other important things … like education, infrastructure, and other investments. This is a challenge that impacts everyone because health is so integral to a prosperous society.**

Q: How should the public and private sectors be working together to improve the US healthcare system?

Seema Verma: The private sector should be leading. There's no reason to sit around and wait for the government to innovate when it comes to creating new care models. Government can sometimes be an accelerator, by supporting and investing behind things that work, or an arbiter, in terms of establishing and managing the regulatory rules of the road. There are areas where it makes sense for the public sector to lead, particularly on things such as interoperability and coverage. But it takes the private sector to pull everything together, turn regulations into reality, and deliver products that impact patients' lives.

Q: What are the biggest opportunities in healthcare today?

Seema Verma: Technology is going to be deeply transformational because the healthcare sector remains out of step with the rest of the world. Some providers still use fax machines if you can believe it. We had an initiative at CMS called "patients not paperwork" precisely to address the issue that so much time and energy is wasted on back-office work, which distracts from the core mission of delivering high-quality care. Many providers are contending with staffing challenges and rising wages. But there are ways to alleviate the ongoing workforce burden though the adoption of new technologies, including the advances in AI.

Technology can help elderly citizens live independently to reduce the reliance on nursing homes and institutional care. We can use predictive analytics to intervene preventatively and help keep people out of the hospital. There are also ways in which technology will directly improve the doctor-patient relationship. We recently demoed a tool at Oracle that listens to clinical conversations and can then directly input notes into a patient's Electronic Medical Record (EMR). It's products like these that mean medicine is going to be fundamentally different in 5-10 years because of new technology tools.

> "Medicine is going to be fundamentally different in the next 5-10 years because of new technology tools.

Q: How do you think about the impact of AI on healthcare?

Seema Verma: AI has the potential to be very positive, though in the short term the biggest disruptions will likely happen in non-clinical areas like registration, scheduling, payment, and prior authorization. There's so much manual work in healthcare, particularly administrative manual work that isn't patient facing. That's where we will likely see the quickest adoption and deployment of AI because there are fewer frictions in those domains. The timing is also good because we now have much more patient data and interoperability between systems. There's a real opportunity to harness that data for things like precision medicine. There are also significant possible applications for clinical trials and helping to make that process go faster and be more effective.

Where adoption may be more challenging is in patient-facing contexts. In areas where doctors are making diagnoses or providing suggestions to patients, there are going to be more issues of reliability and workflow management. There are myriad legal considerations that still have to be resolved.

While the technology might be available to have an AI clinical assistants in everybody's Electronic Medical Record, we have to think through the implications of that very carefully. This may eventually be the model, but I see a lot of workflow, legal, and financial issues that will have to be sorted out first. Regulation is also going to play an important role in determining the pace of AI adoption in the healthcare sector. Governments are way behind innovators on this, and it's going to take a while for them to catch up. Until there's a clearer regulatory architecture, providers are going to be wary when businesses come around selling their latest AI tool. The questions of how it's been developed, tested, and validated will inevitably come up. As a result, my sense is that disruption will happen much faster in some parts of healthcare and slower in others.

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Q: Could technological progress catalyze cost reduction?

Seema Verma: It could go both ways. On the one hand, patients are likely going to receive higher-quality and less expensive care because doctors will be adhering more to clinical guidelines. On the other, the ability to leverage so much data and information may lead to a greater number of interventions over time, which would be more costly on net. It could be that we're spending more on treatments because we now understand their value much better than in the past. It's not immediately clear to me how these efficiencies are going to impact cost, though I do believe care quality will increase.

Q: What keeps you passionate about improving US healthcare?

Seema Verma: The deep need. If we keep spending this much on healthcare, we're not going to be able to afford so many other important things, including education, the climate transition, and infrastructure. Healthcare costs are contributing significantly to the deficit and national debt. My budget at CMS was bigger than the entire defense budget, which is astounding. If we don't figure out how to do something about this, our position in the world will be weaker and our future less bright.

This is a challenge that impacts everyone because health is integral to a prosperous society. As we learned during Covid, when people are sick it has huge social and economic implications. On a more personal level, healthcare is so complex, and the existing system is so intractable that every day feels like solving a puzzle. I enjoy the challenge, am always learning, and am constantly humbled by how much more there is to learn.

TPG INSIGHTS

Interview with Katherine Wood

Katherine Wood is a **Partner** with TPG Capital based in San Francisco, where she has focused on investments in the healthcare sector since 2009. Below, she discusses the biggest trends in healthcare private equity, where we are in the current market cycle, and how investing in healthcare innovation can improve quality and affordability for patients.

Q: What's the outlook for healthcare private equity today?

Katherine Wood: Despite its recent popularity, healthcare wasn't a particularly desired sector at the beginning of my career. There was a perception that it was too technical, with complicated regulatory and reimbursement risks. That said, it's long been an attractive investment area, in our view, because of the powerful secular growth forces underway. There are a range of crosscurrents in the marketplace today. Some of them are new, and others have been around for quite some time.

As the market has slowed somewhat over the past 12 months, corporations have started to tighten their belts and reassess their priorities. This includes carving out businesses where they're not going to be able to invest the required time and resources. Throughout this period, we've maintained a high level of activity and our focus on finding advantageous partnerships and win-win situations, which has led to a number of new opportunities.

There's also enhanced focus on containing costs given the unsustainable pressures in the system. Over time, we've seen that there are some "unnatural" profit pools in healthcare that tend to last until they don't. This could be a service where a lot of revenue comes from a few patients or where patients have little choice but to pay large fees. We have seen some of these models start to unwind in recent years.

Q: Where do you see the biggest opportunities?

Katherine Wood: The intersection of healthcare and technology, for one. While healthcare represents almost 20% of the US economy–amazingly larger than India's entire GDP–it accounts for only about 5% of the tech spend. There's a lot of waste in healthcare for which technology is a natural solution. It's possible to invest not only behind technology penetration itself but also in the thematic end markets benefiting from technological change. That includes supporting patient-friendly care models, such as home health, that are leveraging the ability to deliver care more efficiently outside of the hospital setting. Technology also helps with the fact that care providers are overburdened and frankly burned out. The more we can enable providers to spend more time with patients delivering care and less time filling out paperwork the better.

Beyond technology, there are several other important areas of healthcare innovation. In care delivery, we believe value-based care aligns incentives much better than legacy fee-for-service reimbursement. Value-based care often delivers high-quality care at a lower cost with a better patient experience. The Medicare Advantage program is a good example of this and has grown rapidly as a result. In fact, for the first time this year, more seniors will choose Medicare Advantage than tradition Fee-for-Service Medicare.

On the therapeutics side, there are opportunities to support a new class of drugs called cell and gene therapies. These drugs modify genes to treat the root cause of previously untreatable diseases. Their growth was accelerated by the COVID vaccines, which used these technologies. Lastly, it's often the case that the right risk-reward is in the "picks and shovels" companies that are part of the critical supply chain for innovative devices or drugs.

Q: Where are we in the current market cycle for healthcare PE?

Katherine Wood: A point of inflection. There's a tremendous amount of change in healthcare private equity today, whether it's novel care delivery models, innovative therapeutics, or more consumer-minded patients. And in these moments of change, there's opportunity. From a valuation perspective, it's not yet clear what the new normal will be, given we haven't had long-term interest rates this high in decades. But there are still plenty of high-quality healthcare companies in the marketplace. In these difficult

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environments, the number of carveouts and corporate partnerships tends to go up. These transactions are often done for reasons beyond just price, and they benefit sponsors who have long-term corporate relationships and have proven to be good partners.

It's also possible to mine deep veins and invest behind the same theme multiple times. Each deal benefits from pattern recognition and an ecosystem of relationships. We often work with trusted executives and board members multiple times, and we can redeploy a similar value creation toolkit from a past deal to support a new portfolio company. This combination of a market that's inflecting and our ability to leverage a time-tested playbook means that we've remained very active despite the choppier market.

Q: Does your playbook change given the more challenging macro backdrop?

Katherine Wood: It evolves but doesn't change. We're growth investors at scale. Our job is being students of our space, backing the rights teams, and driving growth. The vast majority of our returns come from growth. It's not from cost cutting, leverage, or even buying and selling at the right time. It's about finding companies in strategic areas of healthcare and maximizing their potential.

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Of course, we need to be attuned to the interest rate environment. But we've never sought to maximize debt or financial engineering. We would much rather leave flexibility for the company to invest than take the last dollar of debt offered. There will be parts of the market where the air comes out of the balloon and profit pools that have existed for some time get squeezed. But models of healthcare that are aligned with improving quality, lowering cost, and delivering innovation will continue to be growth areas. We'll be focused on investing behind those models no matter the economic backdrop.

> "There will be parts of the market where the air comes out of the balloon and profit pools that have existed for some time get squeezed. But models of healthcare that are aligned with improving quality, lowering cost, and delivering innovation will continue to be growth areas.

Q: How do you partner with companies to improve patient outcomes?

Katherine Wood: One of the best parts of my job is supporting life-changing innovations and care models. In pharma, this can mean developing a cure for a genetic condition where children are unable to walk. After a single shot of the therapy to switch out the defective gene for a normal one, they're running and swimming a few weeks later. But our focus on patient impact can also involve more subtle things, such as the careful decision criteria we use to ensure that any company we invest in has a strong quality track record. It doesn't always show up directly in the financial results, but it's a critical aspect of what we do.

In another case, we partnered with an outpatient behavioral health company that's serving an important societal need to improve access to more affordable mental healthcare. About half of the psychiatrists in the US don't accept insurance. They're cash-only businesses. One of the reasons we invested in this company is that all of their providers accept insurance, which makes care more affordable for many patients. We're proud that we've helped them quadruple their provider base and increased their ability to serve an even larger patient base by bringing more and more therapists onto the platform.

We also invested in a multi-specialty physician group which has the only Medicare Advantage plan to receive a 5-star rating from the Centers for Medicare and Medicaid Services (CMS) for 7 years in a row. This speaks to their exceptional care quality. When we invested, they'd never really marketed this impressive plan to new members! So, we helped them with that and ultimately made the plan available to more patients.

All the companies that we partner with have a long history before we arrive. Our job is investing behind organizations that value quality—whether it's in clinical care, manufacturing excellence, or scientific rigor.

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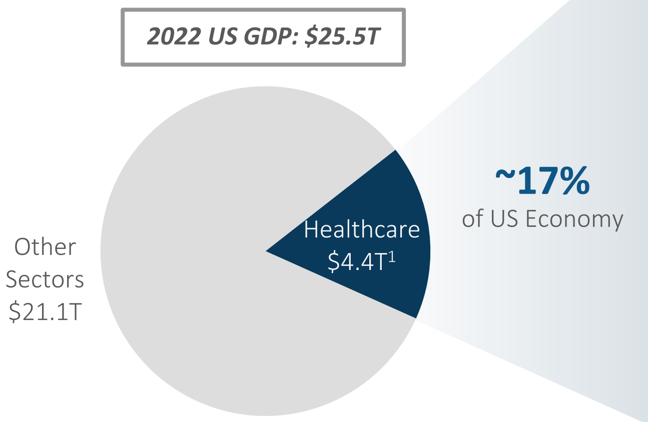
Katherine Wood: An advantage of our model is that we're focused on making companies more valuable not in the next quarter but over the coming 5-10 years. This means that even when there are market disruptions, you can still double down on your plans to grow and scale. You can fund a surge investing program or double R&D, which we've done on average in our product companies, even if there's temporary macro turbulence. Our goal is to build healthy, high-performing businesses that are more strategic in their ecosystem. To do so, it's critical to invest for the long term even when there's pressure to solve for the short term.

TPG INSIGHTS

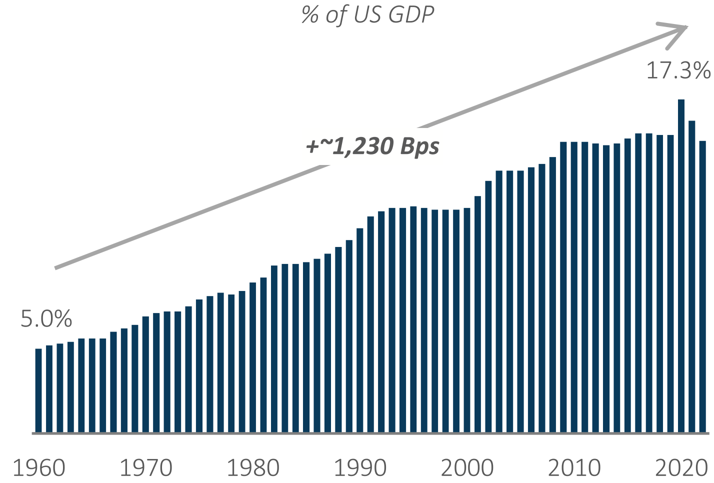
A Snapshot of Healthcare Private Equity

The US Healthcare Industry Is On Track To Reach ~$7T In Revenue By 2031

2022 US Gross Domestic Product



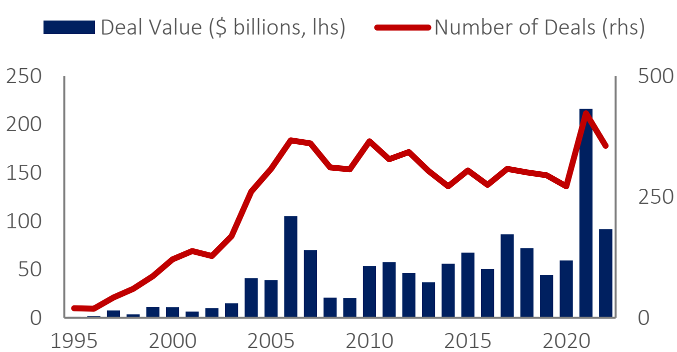
US National Health Expenditure
% of US GDP



1. 2022 NHE based on estimates from CMS.
Source: CMS (2023), Bureau of Economic Analysis (2023), and World Bank Group (2023).

Healthcare PE Has Grown Significantly In Recent Decades

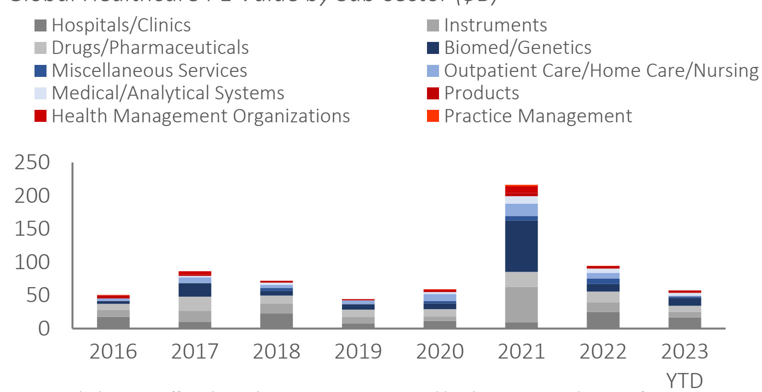
Global healthcare PE Value ($B, lhs) and Volume (Count, rhs)



Note: Excludes spin-offs, ad-ons, loan-to-own, SPACs, and bankrupt assets; data as of November 2023.
Source: Dealogic, TPG.

Driven By A Diverse Group Of Sizable Sub-Sectors

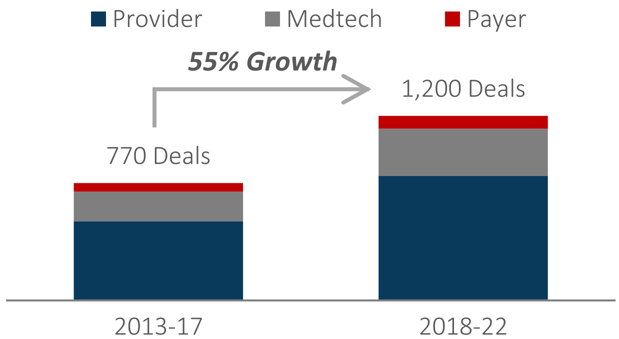
Global Healthcare PE Value by Sub-sector ($B)



Note: Excludes spin-offs, ad-ons, loan-to-own, SPACs, and bankrupt assets; data as of November 2023.
Source: Dealogic, TPG.

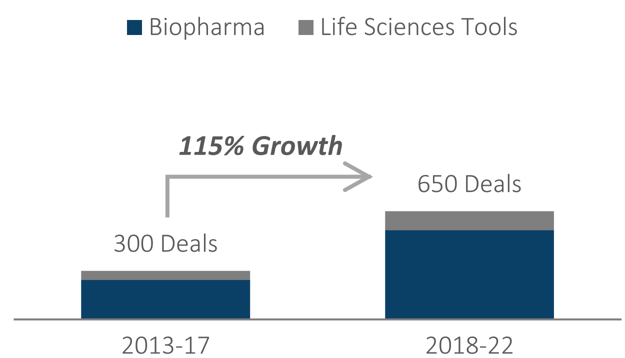
Deal Volumes Have Grown By >50% In the Provider, Medtech, and Payer Spaces

Global Healthcare PE Deal Volumes by Sector, Count



Biopharma And Life Sciences Tools Have Seen >100% Growth

Global Healthcare PE Deal Volumes by Sector, Count



Note: Excludes spin-offs, ad-ons, loan-to-own, SPACs, and bankrupt assets; data as of November 2023.
Source: Dealogic, Bain, TPG.

TPG INSIGHTS

Interview with Zach Ferguson

Zach Ferguson is a **Partner** with TPG Growth based in San Francisco, where he is a member of the Healthcare team. He invests across the provider services and technology and pharma services sectors and was named one of Growth Cap's Top 25 Healthcare Investors in 2023. Below, he discusses the biggest trends and opportunities that he's seeing in growth-stage healthcare today.

Q: How does the current environment for growth-stage healthcare compare to past moments in your career?

Zach Ferguson: It's always been the case that healthcare is a somewhat more recession-proof industry given spending in the sector is countercyclical and most people are reluctant to cut back even in a downturn. As a result, a lot of investors look at healthcare today against the backdrop of elevated recession risk and feel as though it offers a safe bet. There's definitely truth to that. But what's really unique about the current setup for US healthcare is the opportunities and challenges stemming from the baby boomer population aging into Medicare.

We're already seeing the impact of this demographic dynamic in the sharp increase in the volume of services across the healthcare sector. The sheer number of procedures is putting a strain on the entire healthcare workforce, as there simply aren't enough clinicians, nurses, and specialists to satisfy demand. This is why we believe tech enablement is going to play such a big role in the years ahead. We have no choice but to find new and innovative ways to efficiently scale up our existing healthcare infrastructure to take care of an aging population. That's exactly where growth-stage healthcare comes in because it's so critical to facilitating this scale transformation.

Q: What are the biggest trends in growth-stage healthcare today?

Zach Ferguson: Value-based care is far and away the most important. While it takes many forms, value-based care is, at its core, a delivery model where providers are paid based on patient outcomes, and the focus is on aligning incentives so that the best care is provided at the lowest possible price. That should be the lowest price for the employer or the insurance company and the patient. Finding opportunities where each of these groups wins is where value-based care is most successful. Within value-based care, we're incredibly focused on the ongoing "site-of-care shift" that's seeing care increasingly move from the inpatient and hospital campus settings to the ambulatory setting, when appropriate. That broadly entails moving procedures from high-cost to low-cost settings. It means a shift away from relatively complex and inconvenient care and towards care in patients' local communities. It could be care at a more retail-oriented facility or home-based care. The general idea is moving beyond the four walls of the hospital to deliver care in a more convenient and consumer-friendly way without compromising quality.

The site of care shift has been a trend for some time, but the pandemic accelerated the pace of change in many ways. One example was the huge increase in the number of people receiving care virtually and businesses investing in their ability to deliver care this way. There are some places, such as virtual primary care, where we've seen mean reversion in the volume of patient visits while in others like behavioral health, the shift towards virtual care has stuck. But the big picture is that the site-of-care shift is a mega theme that will be with us for years to come and have an outsized impact on the future of healthcare.

Q: Are there other major opportunities that you're focused on?

Zach Ferguson: Healthcare is distinct from many other sectors in that the biggest shifts tend to play out over a long period of time. It's an evolution, not a revolution. Our general strategy is seeking out those companies and opportunities that are on the right side of long-term trends and market dynamics. So, as mentioned, tech enablement is another mega trend that we're following closely because many parts of our healthcare system are still two steps behind when it comes to adopting the latest technologies. In many cases, tech enablement involves tools that make doctors and providers more efficient, such that you're getting more care at a higher quality from the same sized workforce. This is so important because demographic realities and labor market scarcity are going to force us to make drastic improvements to the current system in the next few decades.

> **Healthcare is distinct from many other sectors in that the biggest shifts tend to play out over a long period of time. It's an evolution, not a revolution.**

Another important theme is the rising cost of care and its impact on consumer choice. Patients are generally paying far more for healthcare today through high deductible plans and other cost-sharing programs than in the past. Along with these higher costs, they're understandably demanding more choice in how they receive their care, including opting for more convenient out-patient options, which is driving volume towards ambulatory settings.

Q: What's unique about growth-stage healthcare investing compared to investing at another stage in the life of a business?

Zach Ferguson: Growth-stage healthcare is all about scaling businesses. We take this a step further and focus on responsibly scaling businesses to position them for long-term profitability and their patients for positive health outcomes. This requires adding to senior management teams and teams just below senior management in order to improve company performance. But the other piece that's often overlooked is the need to upgrade systems and make sure companies have the right infrastructure in place as they grow. In a world of increased remote work, it's become much more challenging to manage a dispersed workforce, especially if you're trying to drive big company-wide changes. Technology can help a lot with this challenge, but it's also quite important to make sure teams are all on the same page even if everyone isn't seeing one another in person five days a week.

> "Growth-stage healthcare is all about scaling businesses. We take this a step further and focus on responsibly scaling businesses to position them for long-term profitability and their patients for positive health outcomes.

Q: How are you navigating the current inflationary environment as you work with firm leaders at portfolio companies or assess new investment opportunities?

Zach Ferguson: It's certainly a key area of focus. First, we're actively looking at ways to train, recruit, and retain workforce talent because of how tight the labor market is today. Sometimes that's as simple as creating new internal training programs so that employees can advance their careers at our companies rather than switching jobs in order to progress in their careers. Second, with new deals, we're actively assessing whether management teams have thought carefully about these workforce and cost challenges. They don't necessarily need to have all the solutions figured out, but we want to see that teams are aware of the types of pressures their business models are going to face and it's a part of how they think about their vision for the future.

Q: What are you hearing from management teams as you assess new investment opportunities?

Zach Ferguson: Management teams are incredibly focused on what GPs can bring to the table, which is a bit of a shift in the private equity market. Good management teams have much more choice today about who they want to partner with. They're typically thinking about the next five years of their business, and so they want to make sure that whoever they're working with fits the plan and vision that they have for the future. In particular, they want to know that any prospective sponsor is aligned with how they view the future of their sector, the key themes and trends, and how they do business.

> "Management teams are incredibly focused on what GPs can bring to the table, which is a bit of a shift in the private equity market… They want to make sure that whoever they're working with fits the plan and vision that they have for the future.

Q: What do you like most about being a growth-stage healthcare investor?

Zach Ferguson: US healthcare is a $4 trillion market. So, no matter how long you've been investing in the sector, you're always encountering something new. There are always spaces that you haven't thought about or even seen. But these so-called "niches" are often billion-dollar or 25 billion-dollar markets. That's plenty big enough to build a successful business, even though it's considered small relative the entire US healthcare market.

> "US healthcare is a $4 trillion market. So, no matter how long you've been investing in the sector, you're always seeing something new.

As an investor, this creates an opportunity for constant learning and growth. I also love the fact that as a growth-stage investor I'm tasked with the opportunity to build a new and better version of healthcare that benefits both patients and providers. Building an urgent care business, for example, enables you to completely change the care landscape across many markets and drastically improve patients' outcomes and lives in the process. That's a very rewarding project to be involved in.

TPG INSIGHTS

Interview with Shinichiro Fuse, Carolyn Ng and Lucian Iancovici

Shinichiro Fuse, PhD, **Carolyn Ng, PhD**, and **Lucian Iancovici, MD**, are Partners and Managing Directors of **TPG's Life Sciences Innovations (LSI)** fund. Collectively, they have multiple decades of experience investing across the life sciences and biopharma sectors. Below, they discuss why they believe we're in a "Golden Age" for life sciences, how well-targeted investments can inflect the path of drug discovery and development, and the impact of AI on the biopharma industry.

Q: Why do you believe we're in a "Golden Age" for life sciences?

Lucian Iancovici: The current moment is more than 20 years in the making. In 1999, the genome was sequenced for $1-$2B. It costs less than $1K to do so today. That pace of innovation is roughly twice as fast as Moore's Law that's fueled the digital revolution. The ability to sequence DNA quickly and cheaply has enabled a massive increase in diagnostic tools and equipped us to discover new pathways and better understand disease.

At the same time, there's been a revolution in traditional chemistry and the science of small molecules. We can do things with precision that weren't previously possible because of AI and machine learning. When you put this all together, we're just starting to have the right information, the right tools, and sufficient financial capital for many of these groundbreaking innovations to be commercialized in a way that is scalable and will fundamentally change patients' lives.

Shinichiro Fuse: It starts with a groundswell of innovation. The mRNA vaccines from Moderna and BioNTech to fight Covid-19, which were just awarded a Nobel prize, are perhaps the clearest example. But there are many instances where innovation has leaped forward beyond what we'd previously thought possible and is now having meaningful patient impact. The gene editing technology CRISPR, which is essentially molecular surgery that enables DNA to be altered at the precision of a single nucleotide, is already being used in the patient setting to treat sickle cell disease and has shown results that are effectively curative. Cancer immunotherapy, which uses the immune system rather than radiation to treat cancer, has revolutionized the treatment of many types of cancer.

Second, the FDA has been supportive of this innovation. The number of FDA approvals for new technologies and modalities has increased meaningfully in the past few years, which raises the likelihood that new companies and drugs will be successful.

Third, big pharma faces a major patent cliff between now and 2030, with around $200B of revenue at risk due to patent expirations. Lastly, there's been a major reset in the public markets, which has since trickled into the private markets and created much more favorable entry valuations for many companies.

Q: Why are we seeing a surge in interest among LPs and GPs in the life sciences industry?

Carolyn Ng: There are few industries where you can save lives while also driving outsized financial returns. But that's precisely the opportunity in life sciences and biopharma. Many of the drugs that we invest in represent an opportunity to save the lives of patients with severe diseases. Ultimately, investors in this space are able to achieve both financial and social goals, which is an incredibly attractive value proposition.

Lucian Iancovici: As a physician by training, I'm energized these days because we're seeing a meaningful improvement in patient outcomes. This resonates with both LPs and GPs. For example, it was only 10 years ago that the FDA approved a drug with the ability to cure Hepatitis C infections. Hep C is a disease that had a massive burden on society, but now patients no longer have to worry about dying of liver failure. Sickle cell disease can potentially be cured now with just one treatment. Across so many areas of medicine, novel drugs and therapeutics are radically improving patient outcomes and so there's understandably a lot of enthusiasm in the marketplace.

Q: What's the role of life sciences funds in financing and supporting these life-saving innovations?

Carolyn Ng: We like to think of ourselves as providing "inflection capital", which is a term we coined to capture our role in funding new technologies and medicines to the point at which they've demonstrated a clinical proof of concept. This means that a drug has been shown to be efficacious and safe in humans for the first time. We view this as *the* critical point for a drug because that's

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There are few industries where you can save lives while also driving outsized financial returns. But that's precisely the opportunity in life sciences and biopharma.

what drives significant value inflection for the company, be it by generating a sizable mark-up in its valuation, creating a viable path to an IPO, or even opening up opportunities for M&A.

Inflection capital fills an important financing gap that exists in the market. The private market for life sciences has traditionally had two categories of investors. The first category of funds has historically been focused on company creation. This is effectively taking ideas directly from the academic setting and creating very early-stage companies based on the latest innovations in research.

On the other end of the spectrum, there are later-stage investors, including crossover and public funds, that typically come into a company because they think it's going to go public in the near future. In between, there's a significant gap for funding because the path for drug development is long and arduous. This is where there's an opportunity for inflection capital to fund the drugs and companies that are developing the innovative medicines and technologies of the future.

> "We see the opportunity for inflection capital to fund the drugs and companies that are building the innovative technologies of the future.

Q: How do investors identify an inflection point for a drug?

Carolyn Ng: The sweet spot is the overlap between the therapies and drugs that have a high level of interest from pharmaceutical companies and a high probability of success. As Shin mentioned, big pharma is urgently looking to refill its drug pipeline given the pending cliff in existing patents over the next decade. Strategics are looking to acquire assets with blockbuster potential in areas of high unmet needs like precision oncology, precision immunology, ophthalmology, metabolics, and rare diseases.

Once a need is identified, it's important to do a technical deep dive into the asset, technology, and clinical development strategy to better understand its breakthrough potential. But it's equally important to identify the point at which a drug development dataset is most likely to catalyze a step function in terms of valuation and ultimately driving the likelihood of clinical and commercial success. That's what we define as a critical value inflection point.

Q: How might AI impact the process of drug development and discovery in coming years?

Lucian Iancovici: We're seeing that companies are leveraging AI to build interesting new drugs, but our job as investors is to value the underlying assets. We're underwriting the likelihood of a particular drug's success. We believe that value is created in getting assets to the stage where there's a proof of concept. So, AI can certainly be used by companies to try and help find unique assets. If it ends up working, it will increase their value because they will have a differentiated ability to bring novel products to market and build a broader platform. But our focus is centered more on the existing portfolio of assets they've created and their opportunity to have breakthrough potential.

Carolyn Ng: Drug development is a very long process that involves many stages. I think the lay understanding is that AI is going to empower every single step of the process and suddenly we're going to have all these blockbuster drugs in a matter of months. That's not true, at least not yet. AI is an incredibly powerful enabling tool for specific aspects of drug development, but it's not magic. In fact, AI/ML has been used in drug discovery for several years now. At this point, we think it's premature to say that AI is going to revolutionize the *entire* chain of drug and clinical development, but we're cautiously optimistic that AI will be a powerful positive force in this space.

Q: What does the success of GLP-1 class of drugs like Ozempic and Wegovy suggest about this new Golden Age of life science that you're describing?

Shinichiro Fuse: These drugs are sparking a new wave of innovation. GLP-1s have been around for over a decade. But as was the case with statins, it's really the later entrants in the market that often open things up. Lipitor was the fifth statin on the market, for example. The same is true for the GLP-1 Mounjaro that's now been approved for the use in the treatment of diabetes. There will be more and more innovation as we continue to work through new areas for improvement and address the side effects of these drugs, including patients' loss of muscle mass. We're very optimistic though about how this will feed into the next cycle of life sciences innovations.

Lucian Iancovici: They're truly remarkable and the effects could be transformative. If you look at the last wave of metabolic and cardiovascular drugs in the 1990s, which were focused on controlling blood pressure and cholesterol, they've had a deep and lasting societal impact. Statins like Lipitor have drastically reduced the number of hospitalizations for many diseases. For example, hospitalizations for ischemic heart disease are down 56% since 1999 and admissions for stroke have fallen by 41%. These drugs are also likely one reason why Medicare spending has grown by around 50% less over the last 10 years than previous forecasts expected.

> "Statins have drastically reduced the number of hospitalizations for ischemic heart disease and strokes … The same sort of progress could happen with obesity in the coming decades because of the GLP-1s.

The same sort of progress could happen with obesity in the coming decades because of the GLP-1s. A recent early-stage study showed these drugs can reduce the incidence of cardiovascular events by 20%. It's certainly not all perfect because they're still quite expensive, there are signs of adverse side effects, and people are going to have to stay on them forever just like blood pressure or cholesterol medication. But the savings over the next 30-40 years could easily be 5-10x the cost.

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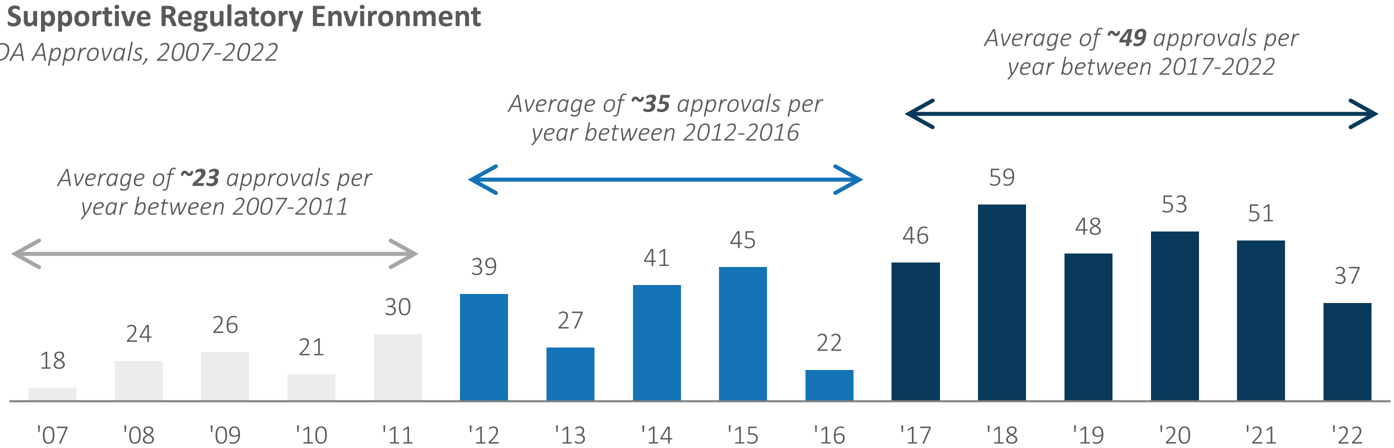
The Outlook For Life Sciences Innovations

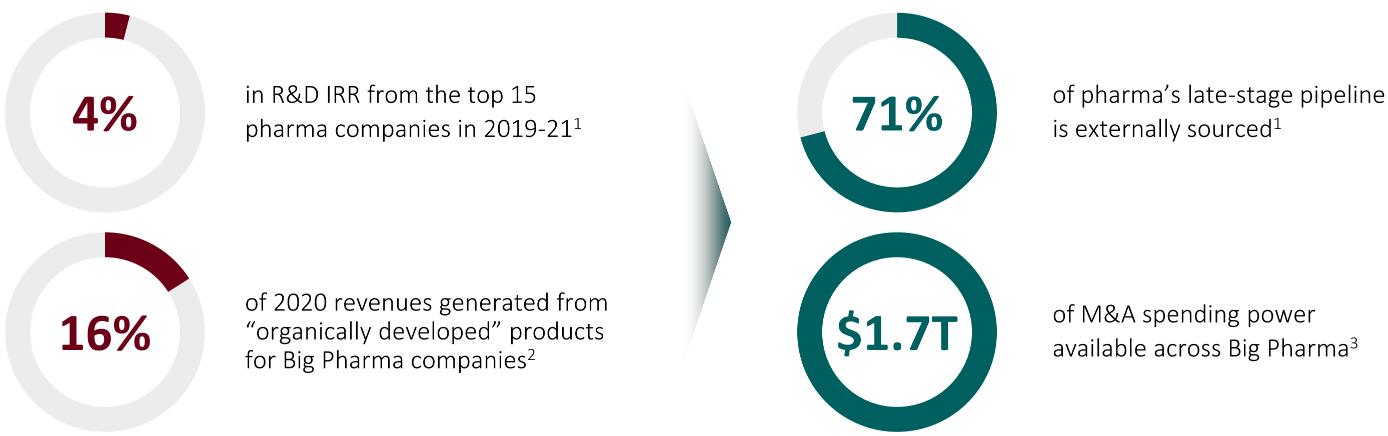
A Supportive Regulatory Environment

FDA Approvals, 2007-2022



Source: FDA website – "New Drugs at FDA"; "2020 FDA Drug Approvals" Nature Reviews Drug Discovery, 2021; "Novel Drug Approvals for 2022" FDA Website, 2022.

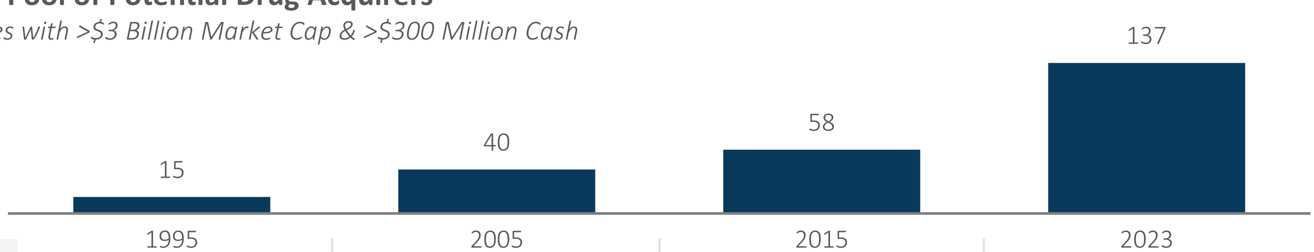
Growing Demand From Big Pharma to Fill Pipeline



Notes: "Organically developed" indicates drugs that were developed in-house. Sources: 1. "Nurturing Growth: Measuring the Returns from Pharmaceutical Innovation 2021." Deloitte, 2022; 2. JP Morgan, analysis of EvaluatePharma data of 2020 revenues for Big Pharma (>$30B in 2020 revenues); 3. Geoffrey Porges SVB Leerink analysis; 4. "The top 15 blockbuster patent expirations coming this decade" – Fierce Biotech, 2021; Estimates are inherently uncertain and subject to change. Actual results may vary.

A Larger Pool of Potential Drug Acquirers

Companies with >$3 Billion Market Cap & >$300 Million Cash



Sample New Entrants

Note: For illustrative purposes only. Logos do not represent past or current TPG investments. US, EU, JP companies.
Source: Capital IQ as of January 2023.

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