



How will deals done
now deliver what the
health ecosystem
needs next?

2020 EY M&A Firepower report
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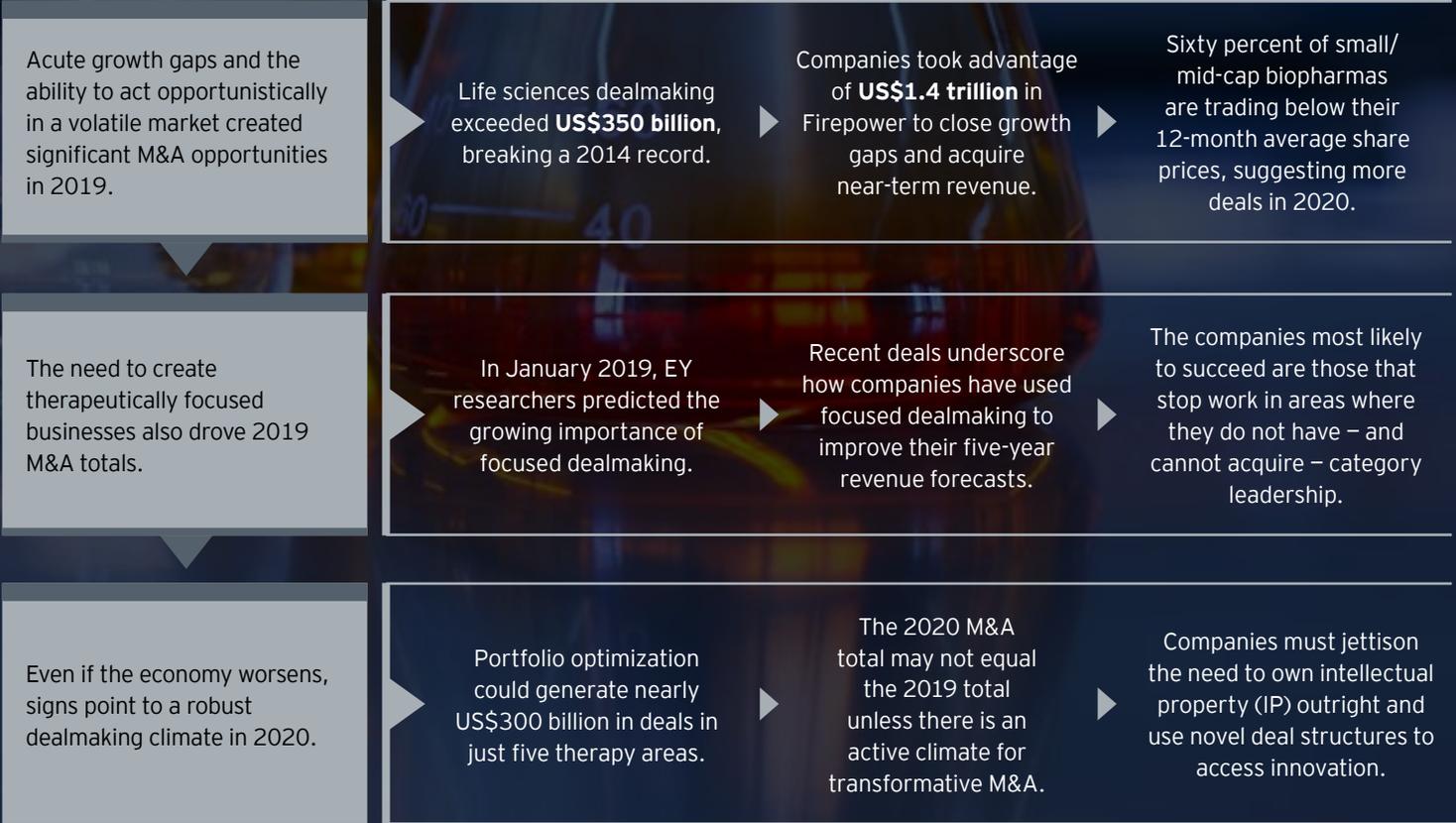
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Executive summary

Context	Trigger	Key question
2019 life sciences dealmaking reached unprecedented levels, as companies sought to increase therapy area focus.	A majority of life sciences companies face capital allocation and growth pressures, while simultaneously positioning themselves for a technology and data-driven future.	How will deals done now deliver what the health ecosystem needs next?

To deliver what the health ecosystem needs next, life sciences companies must use dealmaking to focus their business models, close near-term growth gaps and access future innovation using models that extend beyond M&A.





2019 was truly a “mega” year for life sciences mergers and acquisitions, reaching US\$357 billion in deal value through November, an all-time record. That 2019 had the potential to outpace conventional dealmaking norms became obvious on 3 January when Bristol-Myers Squibb (BMS) announced its acquisition of Celgene.

The transaction was just the first of the year’s four megamergers, yet another reason for the “mega” appellation. (See text box, “Important definitions.”)

But outside the deal total, the 2019 life sciences M&A scene was, paradoxically, conventional. In many cases, the companies that did announce deals adopted a familiar formula: acquire products or services that are on the market, or close to being on the market, that align with internal strategic therapy area priorities.

While record-setting deal totals might be a cause for celebration, there are also reasons for caution. The year’s outsized totals were primarily driven by pharmaceutical buyers, as medical technology and biotechnology companies remained on the M&A sidelines. Moreover, 2019’s exceptional M&A sum wasn’t due to higher deal volumes, but to spending on fewer, more expensive deals as some would-be buyers questioned the high prices of acquisition targets after a yearslong bull market.

Important definitions

Firepower: a company’s capacity to fund transactions based on its balance sheet. It has four key inputs: cash and equivalents; existing debt; debt capacity, including credit lines; and market capitalizations.

Deployed Firepower: the ratio of capital spent on M&A relative to available Firepower.

Growth gap: the difference in US dollars of a biopharma’s sales growth relative to overall drug market sales. This growth gap is defined to be acute if the value exceeds 10% of a company’s annual revenue.

Looking back on 2019, the data suggest companies continue to prioritize a product-centric definition of innovation. The danger of this product-focused orientation is that companies could focus too heavily on developing therapies and devices that are undifferentiated relative to the competition.

At the same time, most companies are not investing sufficiently in data-driven and digital technologies that could drive future value. This contradiction means many companies are under-resourcing the capabilities that will help demonstrate real-world utility precisely when patient outcomes, clinical efficiency and cost measurements become even more central to the value proposition.

The need to adapt to the changing requirements of health customers means companies must also think outside M&A. Indeed, life sciences companies should also consider partnerships with new or existing stakeholders. Ideally, these collaborations should move away from conventional ownership models to structures that apportion risk and reward based on how resources, including analytic skills and data, are shared between different parties to create the personalized products and services in high demand.

To effectively create such collaborations, a change in mindset will be imperative. Companies will succeed not only by owning the IP, but because they have access to critical data and AI to analyze and drive insights from them. If acted upon, these insights can improve the health care experience, clinical decisions and outcomes.

In the *2020 EY M&A Firepower report*, we provide in-depth analysis of the forces that drove dealmaking to new heights in 2019. We also discuss the implications for life sciences business models in the years to come, as we consider how companies will move beyond M&A to collaborations to deliver what the health ecosystem needs next.

Companies will succeed not only by owning IP, but because they have access to critical data and AI to analyze and drive insights from them. If acted upon, these insights can improve the health care experience, clinical decisions and outcomes.

Transformative M&A: deals that are either valued at greater than US\$10 billion or affect more than 50% of either company's market capitalization.

Megamergers: a subset of transformative mergers with valuations of at least US\$40 billion and US\$10 billion for biopharma and medtech acquisitions, respectively.

Bolt-on: small to medium-sized acquisitions that account for less than 25% of the buyer's market capitalization.

Additional details about the EY Firepower Index and the EY analysis can be found in the "Methodology" of this report.



Translating external innovations into market breakthroughs

Stefan Oelrich, Member of the Board of Management and President of the Pharmaceuticals Division, Bayer AG

In 2019, there was some discussion regarding large acquisitions. When targeting large, existing businesses, I believe it's increasingly challenging to create additional value as all scenarios are already built into the price of the deal. Significant synergies would be required to deliver any further value, which are not easy to generate, and, in many cases, companies find themselves subject to bidding wars. Often, it results in attractive deals being outnumbered by less attractive large deals from a value standpoint.

When it comes to external innovation in the pharmaceutical industry, I prefer to either seek out very early-stage assets, or identify assets that are strategically aligned, yet slightly more mature. In terms of the nature of the relationship, I believe in many cases it is beneficial to begin by collaborating and working closely with a partner, before extending the relationship to a full rights management or even an acquisition, if it fits.

Our relationship with Loxo Oncology, which was acquired by Eli Lilly in January 2019, exemplifies what I believe to be one way of bringing external innovation inside Bayer.

When we signed the deal with Loxo in 2017, we obtained partial rights to development and exclusive commercialization rights outside of the US, alongside partial commercialization rights in the US, to two drugs that target tumors with the so-called NTRK mutation. When Eli Lilly acquired Loxo, we exercised full rights to both programs, complementing our own pipeline.

Of our oncology pipeline, our only product that was developed entirely internally was Copanlisib, a PI3 kinase inhibitor to treat lymphoma. The majority of our oncology pipeline has been built together with external partnerships. In order to grow in the oncology space and continue providing new options for patients, we need to collaborate and take full advantage of new molecules discovered outside of Bayer. If we are serious about providing treatments for some of the most debilitating diseases, the pharmaceutical industry needs to acknowledge that harnessing targets developed outside of the organization could potentially be more valuable than those developed internally.

Leaping forward

With this in mind, and to improve our access to truly breakthrough innovations, we created a new organization called LEAPS by Bayer in 2015 with the aim of shifting paradigms in health and agriculture. LEAPS was established to go where venture capital has not yet gone - funding early-stage disruptive technologies where there is no clear pathway for a return on investment in the next two to three years. The goal with LEAPS is to play the long game as a corporate venture capitalist.

However, this is not a case of simply providing seed money. We also take a strategic minority stake in the companies we invest in, enabling us to actively engage in how the startup will focus its efforts. To date, we have made 14 investments in health via LEAPS. In addition to focusing on breakthrough innovation, our goal is also to accelerate the development of the underlying technologies of these companies.

If we are serious about providing treatments for some of the most debilitating diseases, the pharmaceutical industry needs to acknowledge that harnessing targets developed outside of the organization could potentially be more valuable than those developed internally.

One example of a LEAPS investment is BlueRock Therapeutics, an induced pluripotent stem cell developer. This fantastic company could potentially have a therapy ready to go to clinic just three years after it was founded. In August 2019, we leveraged our strategic minority stake and decided to fully acquire the company. BlueRock's lead program is in Parkinson's disease, which is outside our current core areas of commercial interest, but it offers a truly breakthrough solution with potentially regenerative applications that underscores our longer-term view.

A digital pathway

Looking beyond the recent acquisition of BlueRock Therapeutics, we've struggled to leverage M&A and in-licensing to further strengthen our cardiology program. It has been challenging to identify opportunities that go beyond our strong internal capabilities. However, I see some potential value in the diversification of our offering by investing in new digital technology platforms. This would allow us to pair up our internal cardiology innovations with devices and digital biomarkers, with the goal of developing a platform that can support long-term behavioral modifications for patients with chronic diseases.

If such a platform is robust and enough people use it, there will be statistically significant data to identify behavioral modifications that improve individual outcomes. In this regard, the future could see us establishing product outcomes that we can sell to payers or employers on a per patient or population basis. However, it is my belief that digital solutions of this kind should not be directly linked to a specific product.

Such digital technologies need to exist as a stand-alone, reimbursable solution separate from our therapies, although it seems early days for scalable digital solutions. We see a few players beginning to emerge, and Bayer certainly wants to be part of the wave. It remains to be seen if these solutions need to be created completely in-house. As with LEAPS by Bayer, I could envision a model whereby we own a strategic minority stake, before subsequently consolidating our ownership on an arm's-length basis to ensure that innovation continues to flourish.

A look back at 2019



Four forces combined to drive 2019's landmark activity:

1. Readily available capital for deals, what we call "Firepower"
2. Slowing revenue growth at life sciences incumbents
3. A recalibration of the US and European public markets
4. A desire to deepen therapy area focus

Since 2013, EY researchers have used a metric called Firepower to understand the dealmaking dynamics of the life sciences industry. (See "Important definitions" for more on the Firepower methodology.) In 2019, Firepower was at or near all-time highs, meaning companies had plenty of scope to pursue acquisitions, including transformative M&A. Indeed, the year's four megadeals – BMS/Celgene, AbbVie/Allergan, Danaher/GE and Pfizer/Mylan – helped drive the M&A spike, contributing a combined US\$231 billion to the total. (See Figure 1.)

Figure 1. Four megadeals drive 2019 deal total

An examination of the year's four megadeals, worth a combined US\$231 billion, illustrates how Firepower, growth gaps, opportunism and the need for therapeutic focus contributed to an extremely active dealmaking climate. As the buyers work through post-deal specifics, they will also need to consider data-centric capabilities that are appropriate for their chosen business models.

BMS/Celgene

- ▶ **Deal drivers:** Slowing sales growth of BMS's Opdivo; a 20% year-on-year drop in Celgene's share price; significant overlap between Celgene and BMS portfolios.
- ▶ **Business model focus:** The addition of Celgene to BMS increases BMS' breakthrough innovation capabilities.
- ▶ **Future needs:** BMS should consider alliances that improve real-world data capture to better demonstrate product value.

AbbVie/Allergan

- ▶ **Deal drivers:** AbbVie's reliance on Humira for revenue growth; falling share price of Allergan due to negative clinical news and shareholder activism.
- ▶ **Business model focus:** The addition of Allergan diversifies AbbVie's therapeutic focus away from managing chronic immunological diseases.
- ▶ **Future needs:** AbbVie should consider data-centric capabilities that help patients and doctors better manage disease.

Danaher/GE Healthcare

- ▶ **Deal drivers:** GE Healthcare divests its biopharma products business to Danaher, shrinking its core focus; Danaher gains scale in research products.
- ▶ **Business model focus:** Post-divestiture, GE Healthcare can sharpen its imaging and diagnostics capabilities; Danaher has scale and breadth to supply the research market.
- ▶ **Future needs:** GE should consider investments in AI and analytics to increase disease prevention and prediction capabilities.

Pfizer-Upjohn/Mylan

- ▶ **Deal drivers:** Pfizer divests Upjohn to create a new company with Mylan called Viatris; Mylan expands its geographic reach and product scale.
- ▶ **Business model focus:** Pfizer can preferentially focus on developing breakthrough innovations; the new Viatris can invest in product efficiencies to drive value.
- ▶ **Future needs:** Pfizer should consider technologies that enable the discovery of new breakthroughs; Viatris should prioritize data solutions that streamline production and maximize scale.



Companies across the different life sciences domains did not use their Firepower equally. Indeed, big pharma companies, which deployed 35% of their Firepower in 2019, were responsible for 2019's historic stats.

EY analysis shows that companies across the different life sciences domains did not use their Firepower equally. (See Figure 2.) Indeed, big pharma companies, which deployed 35% of their Firepower in 2019 (compared with just 18% in 2018), were responsible for 2019's historic stats, while most medical technology and biotechnology companies did not complete larger, more transformative transactions. The one exception: Danaher's acquisition of GE Healthcare's biopharma business. (See "Spotlight on medtech.")

EY research also suggests that an uptick in deal volume wasn't the reason for 2019's historic M&A total. Across the different life sciences domains - big pharma, medical technology, biotechnology and specialty pharma/generics - deal volume declined 14% year-on-year and is 29% below the average for the previous five years.

The prolonged bull market and the resulting high valuations of acquisition targets help explain the drop in deal volume. Because of the strong capital markets, there has been a pronounced difference between what buyers expect and what sellers want; this difference may have made would-be acquirers hesitate to advance their strategic priorities.

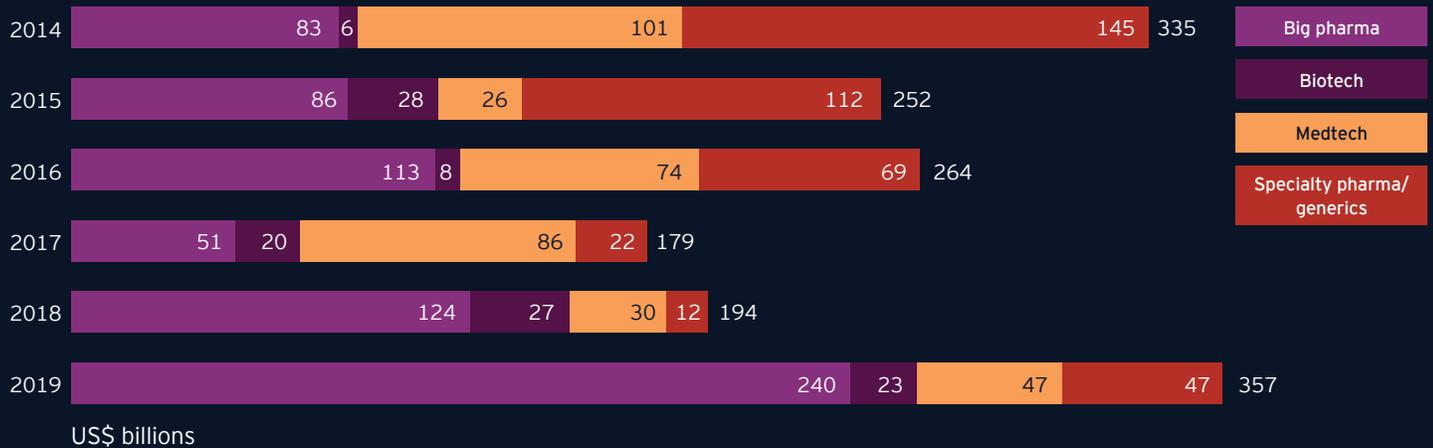
Based on an EY-sponsored survey of life sciences dealmakers from more than 30 US, European or Japanese companies conducted in September 2019, this valuation disparity has been top of mind. Sixty-nine percent of survey respondents noted that in terms of deal prices, the so called "valuation gap" is at its greatest point since 2008. Close to 90% of the respondents "agreed or strongly agreed" with the statement that "sellers have unrealistic valuation expectations."

Undoubtedly, difficulties bridging the valuation gap meant some companies prioritized alliances or product acquisitions over traditional M&A. But as we discuss later in the paper, if companies want to position themselves for sustainable growth, they will likely need to consider two additional strategies:

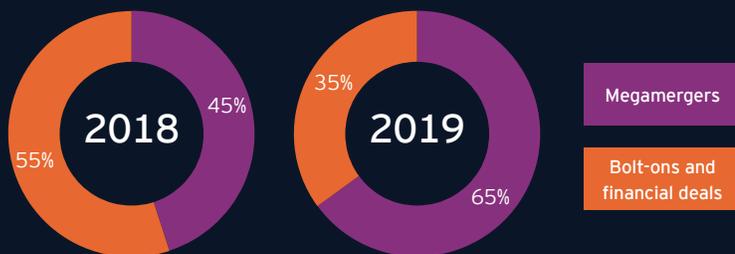
1. Adoption of new valuation methodologies for technologies where the return on investment is still unproven
2. Creation of partnership structures that provide access to critical skills when outright ownership is unaffordable or impossible

Figure 2: 2019 sets new bar for life sciences M&A

Global life sciences M&A (2014-19)

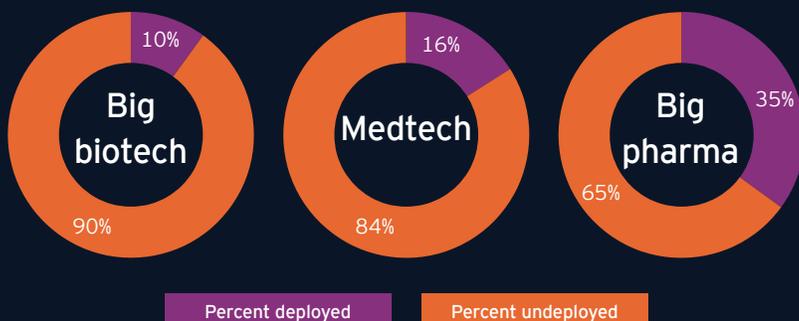


Megamergers drive deal totals



US\$1.4 trillion Firepower holds steady for third year in a row

Deployed Firepower



High valuations discourage dealmaking

69%
of surveyed dealmakers say the valuation gap between buyers and sellers is the largest it's been since 2008

Sources: EY, Capital IQ, Informa's Strategic Transactions. Unless otherwise stated, analyses used data as of 31 December. 2019 M&A data through 30 November. Aggregate Firepower for the life sciences industry, medical technology, big biotech and big pharma companies was calculated using 30 November market data. In September 2019, EY conducted a survey of life sciences dealmakers in the US, Europe and Japan to understand future dealmaking trends.

Spotlight on medtech

Danaher's US\$21.4 billion agreement to buy out GE Healthcare's biopharma business was unique in medtech dealmaking in 2019 and generated more than half of the year's total medtech deal value. As a group, medtech companies deployed only a small fraction of their Firepower in 2019, compared to the bolder moves made by big pharma companies. Indeed, most medtechs emphasized portfolio optimization in lieu of more transformative deals, following a traditional M&A blueprint that has been in evidence since 2015.

For medtechs, portfolio optimization means not only building depth in the right therapeutic areas, but answering bigger picture strategic questions. Some of the biggest companies are highly diversified conglomerates with health verticals. For these giant enterprises, optimization may mean creating free-standing medical device organizations. Witness Siemens' spin-out of its medtech business unit as Siemens Healthineers in 2018, or Philips' gradual transition into a pure-play health company since 2016. Indeed, an IPO of the GE Healthcare segment was also widely anticipated until it chose to sell its biopharma products, which generated 15% of its 2018 revenue, to Danaher.

Even for companies solely focused on medtech, optimizing portfolios involves broader choices than which therapeutic areas will yield growth. We've seen a growing recognition that therapeutic devices may not be the main engine of future growth in medtech. Absent a few standout successes such as Abbott's MitraClip, which has opened up a new cardiovascular market, billion-dollar breakthroughs in therapeutic devices are rare, while high valuations across the industry discourage speculative buys.

Devices that offer a pathway to better outcomes through data-driven personalization represent a major opportunity for medtech. So, too, do technologies such as sensors and artificial intelligence, since they create opportunities for enhanced data capture and usage that also improve patient outcomes. It is no accident that diagnostic technologies have been attracting increasing attention from investors because of the opportunity to create value by customizing therapies or services.

While the leading companies have yet to place major bets on data and analytics, multiple 2019 partnerships suggest that medtechs recognize the need to explore these opportunities. As we noted in the *2019 Pulse of the Industry report*, significant deals include GE's alliance with Roche to integrate in vivo imaging and in vitro laboratory data, Medtronic's partnership with Viz.ai to distribute the startup's stroke-detecting artificial intelligence tool and Siemens Healthineers' alliance with Mentice to integrate the virtual reality simulation company's technology into its surgical offerings.

These partnerships are still too small in scope to position medtech companies for sustainable future growth. But 2019 also demonstrated that when medical technology companies see nearer-term opportunities, they are willing to pay to own them outright. Robotic surgical platforms were top targets in 2019: Medtronic purchased Mazor; Siemens Healthineers bought Corindus Vascular Robotics; Johnson & Johnson acquired Auris Health.

Mind the growth gap

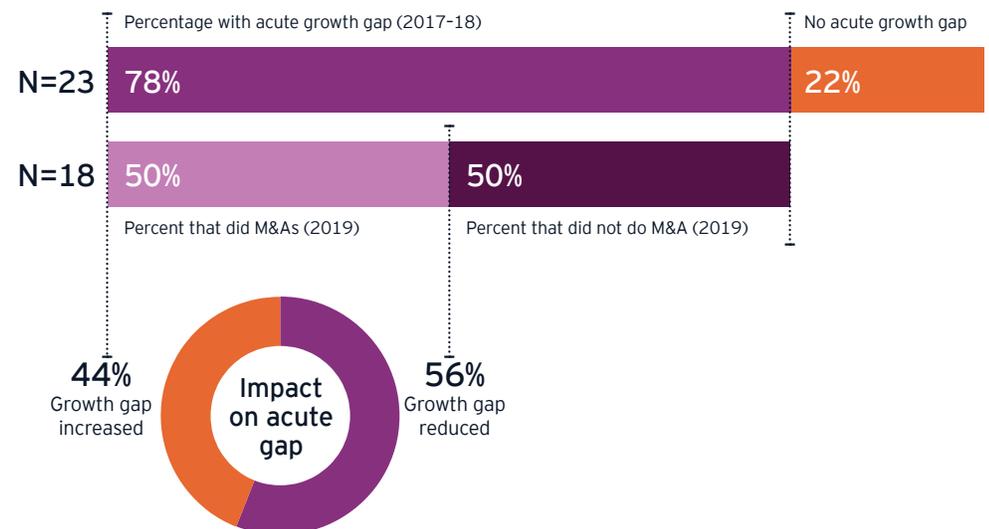
If high valuations meant companies approached M&A cautiously, it's also true that so called "growth gaps" were an important M&A trigger in 2019. (We define the growth gap as the difference between a company's revenue growth and the overall industry's sales expansion.) Thirty-nine percent of the dealmakers who responded to an EY survey listed the need for revenue growth as one of the top two reasons for signing deals. (Access to new innovation or technology was the other top reason to buy.)

To understand the link between growth gaps and deal activity, EY set a threshold for when growth gaps become significant enough that deal urgency increases. Called the "acute growth gap," companies cross this threshold when the difference in absolute dollars between their sales growth and the total industry's revenue growth exceeds 10% of the company's average annual revenue.

In 2017-18, EY analysis found that 18 of 23 biopharmas (78%) had acute growth gaps. (See Figure 3.) Of these 18 companies, 9 signed deals in 2019 to close their growth gaps, either through megamergers or bolt-ons or a combination of the two. But the deals only reduced the growth gaps for five of the nine companies, another sign that traditional product-focused M&A alone will not suffice as companies seek sustainable future revenue growth.

Thirty-nine percent of dealmakers who responded to an EY survey listed the need for revenue growth as one of the top two reasons for signing deals.

Figure 3. As growth gaps became more acute, biopharma companies turned to dealmaking



Sources: EY, Capital IQ and EvaluatePharma. Data as of 30 November 2019. An acute growth gap is defined as a growth gap that exceeds 10% of the average annual revenue. Results may appear inconsistent due to rounding.



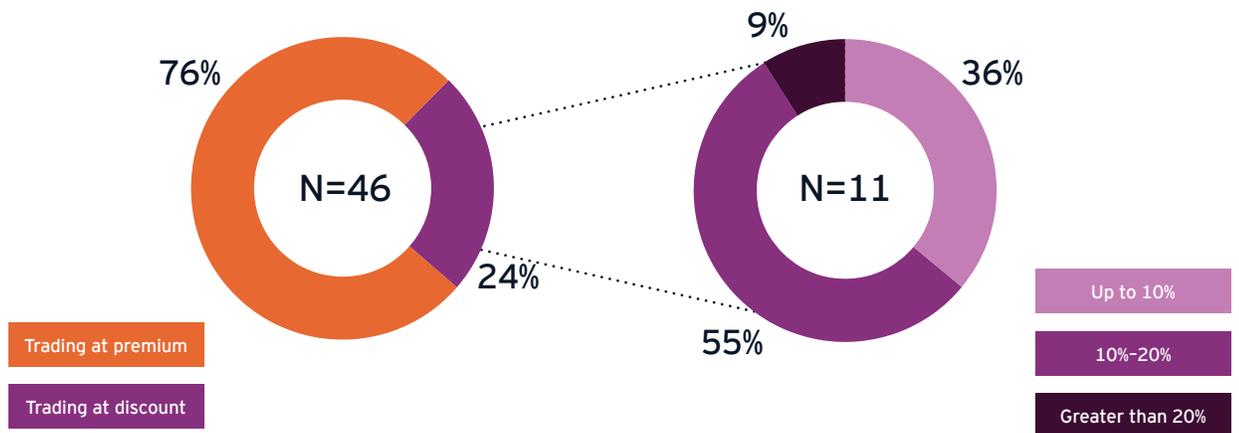
Because acquirers were interested in augmenting near-term revenue, the announced deals often featured products close to market or already approved for use. That meant the deals also came with high price tags. But as 2019 progressed, a softening in the US and European markets linked to clinical failures and chatter about US drug pricing reform combined to depress the valuations of certain acquisition targets.

The data suggest that this market weakness, while not massive, was significant enough for buyers and sellers to find common ground. To understand if market volatility played a role in the year's M&A dynamics, we analyzed more than 40 acquisitions involving public companies valued at more than US\$1 billion. In nearly 25% of the deals we reviewed, the target companies' share prices were trading at a discount relative to

their 12-month average trading prices the day before the deals were announced. Indeed, the ability to act opportunistically appears to have been a factor in both the BMS/Celgene and AbbVie/Allergan megamergers, as well as the purchases of Spark Therapeutics, Tesaro and Loxo Oncology. (See Figure 4.)

If valuations continue to be unsettled in 2020 – and liquidity remains abundant – both buyers and sellers may find it easier to strike deals, galvanizing M&A activity. That is particularly true in the medtech subsector, which has outpaced other life sciences domains and major indices such as the S&P 500 and the Nasdaq.

Figure 4. As target valuations become more volatile, companies are prepared to act opportunistically



Sources: EY and Capital IQ. Data set includes public targets valued at more than US\$1 billion involved in M&A transactions through 15 November 2019. Potential discounts were calculated based on the closing share price the day before an acquisition's announcement relative to its trailing 52-week average. Results may appear inconsistent due to rounding.

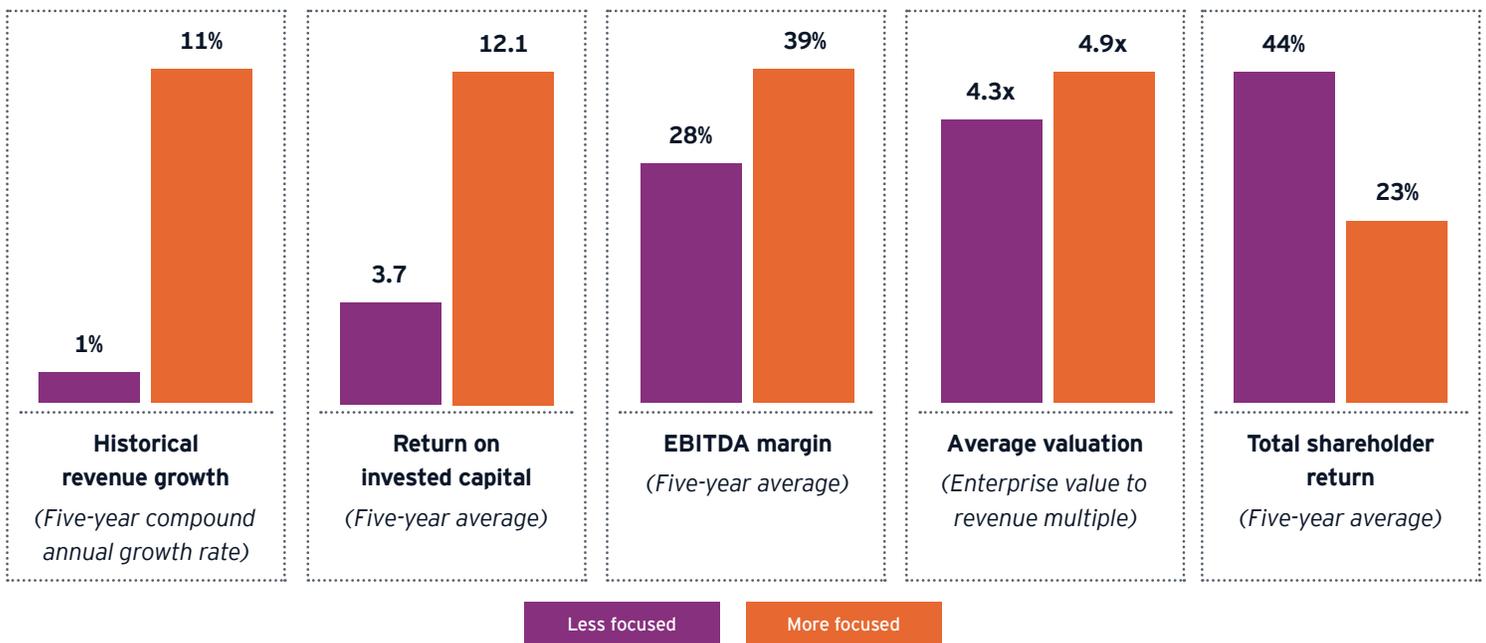


Focused growth continues to drive deals

In addition to maintaining revenue growth, another important driver of deals in 2019 was the desire to increase therapeutic area focus. Therapeutic area focus has been a C-suite talking point for the past several years. But as we outlined in *Life Sciences 4.0: securing value through data-driven platforms*, the potential impact of new scientific modalities and digital technologies, especially the ability to invest disproportionately in data and analytics, increases the urgency to create market-leading capabilities in priority areas of interest.

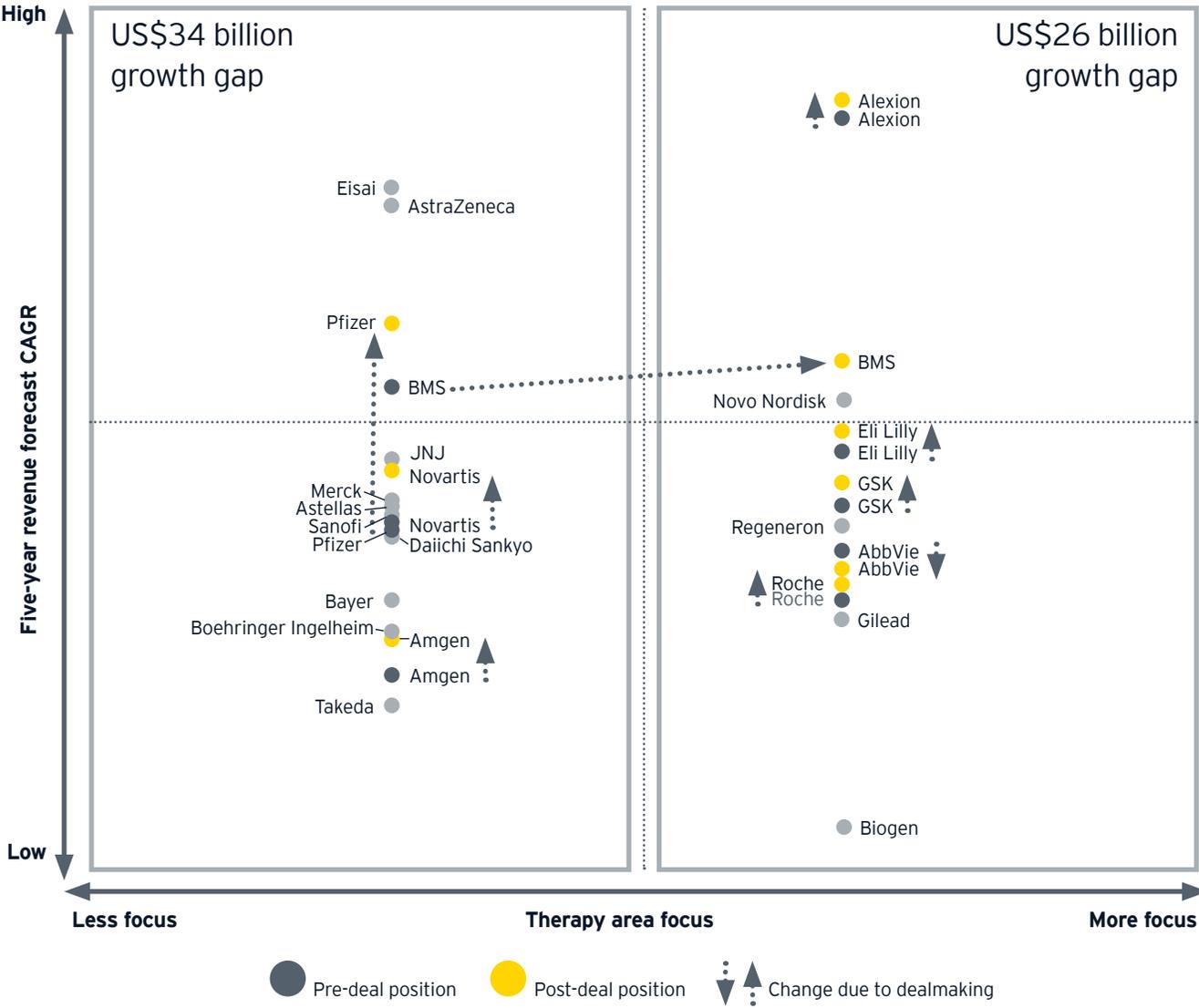
Data originally published in the *2019 EY M&A Firepower report* highlighted the link between therapeutic focus and operational performance. Current data continue to support that thesis: when we analyzed the financial results of 23 top biopharma companies across five operational and financial metrics, we found that the 10 more therapeutically focused companies outperformed the 13 less therapeutically focused organizations on four of the metrics. The only metric in which less therapeutically focused companies outperformed more therapeutically focused organizations was average total shareholder return, where growth concerns associated with biotechs in the data set disproportionately affected the cohort's performance. (See Figure 5.)

Figure 5. More therapeutically focused biopharmas outperform peers on four of five metrics

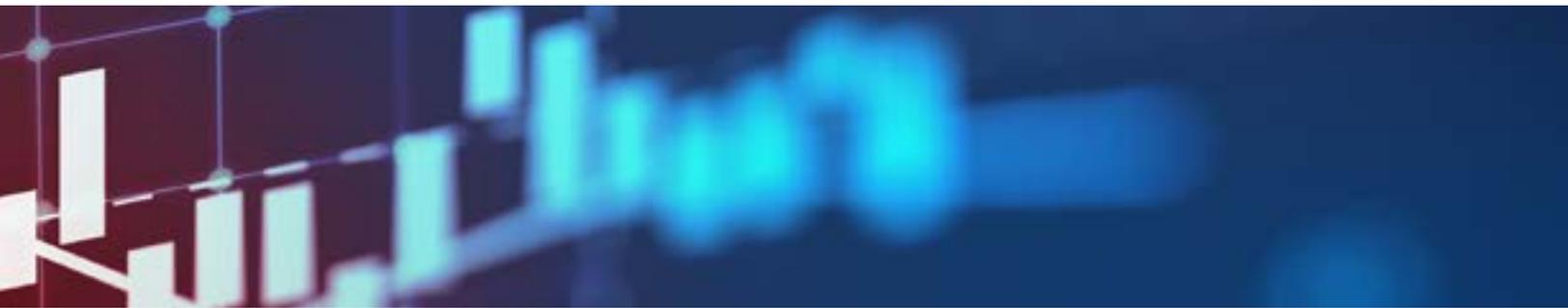


Sources: EY, Capital IQ and EvaluatePharma. Metrics calculated using data through 30 November 2019. Companies were classified as more focused or less focused based on the following criterion: if one therapeutic area contributed more than 50% of a company's biopharma revenue, it was classified as more focused. If 50% of a company's biopharma revenues came from two or more therapeutic areas it was classified as less focused.

Figure 6. Biopharmas that increased their therapeutic focus also improved their growth prospects



Sources: EY, Capital IQ and EvaluatePharma. Data through 30 November 2019. Analysis is based on company biopharma revenues only, not total revenues.



EY analysis suggests that in 2019, almost every major biopharma acquisition increased both the buyer’s overall therapeutic focus and its projected five-year compound annual growth rate. Indeed, 20 of the 25 announced deals we analyzed had high overlap with the purchaser’s existing portfolio as measured by the therapy area or indication of the lead product of the target company. In sum, those deals accounted for nearly 45% of the year’s M&A total.

Two notable exceptions were AbbVie’s purchase of Allergan, which was deliberately intended to diversify the big pharma’s dependence on Humira, and Vertex’s acquisition of Semma Therapeutics. In the latter case, while Vertex has no efforts in Type 1 diabetes, Semma’s emphasis on curative therapies is consistent with the differentiated products the big biotech has prioritized via its current business model. (See Figures 6 and 7.)

Figure 7. Biopharmas use M&A to reposition themselves (selected examples)

Company	2019 dealmaking	Implications
Amgen	<ul style="list-style-type: none"> ▸ Acquires Otezla from Celgene 	<ul style="list-style-type: none"> ▸ Near-term immunology revenue ▸ High overlap with existing portfolio
Bayer	<ul style="list-style-type: none"> ▸ Acquires BlueRock Therapeutics ▸ Acquires full rights to Vitrekvi from Loxo Oncology ▸ Sells animal health assets to Elanco 	<ul style="list-style-type: none"> ▸ Access to cell therapy technology ▸ Near-term revenue in oncology ▸ Creates Firepower for priority therapy areas
Bristol-Myers Squibb	<ul style="list-style-type: none"> ▸ Acquires Celgene 	<ul style="list-style-type: none"> ▸ Deepens oncology and immunology pipeline ▸ Creates leading oncology company by market share
Eli Lilly & Co.	<ul style="list-style-type: none"> ▸ Acquires Loxo Oncology 	<ul style="list-style-type: none"> ▸ Near-term oncology revenue
Merck & Co. Inc.	<ul style="list-style-type: none"> ▸ Acquires Peloton Therapeutics ▸ Acquires Tilos Therapeutics ▸ Acquires Immune Design Corp. 	<ul style="list-style-type: none"> ▸ Boosts late-stage oncology pipeline ▸ Acquires oncology and immunology pipeline ▸ Deepens immunotherapy expertise
Novartis	<ul style="list-style-type: none"> ▸ Acquires IFM Tre ▸ Licenses Xiidra from Shire ▸ Spins off Alcon as independent company ▸ Acquires The Medicines Company 	<ul style="list-style-type: none"> ▸ Acquires clinical-stage anti-inflammatory assets ▸ Obtains near-term ophthalmology revenue ▸ Heightens focus on breakthrough innovations ▸ Acquires potential best-in-class cardiology drug
Pfizer	<ul style="list-style-type: none"> ▸ Acquires Array BioPharma ▸ Sells Upjohn assets to Mylan to create new company, Viatris 	<ul style="list-style-type: none"> ▸ Near-term oncology revenue ▸ Rebalances portfolio to emphasize innovative products
Roche	<ul style="list-style-type: none"> ▸ Acquires Spark Therapeutics 	<ul style="list-style-type: none"> ▸ Bolsters Hemlibra franchise with gene therapy products

Sources: EY, company reports. Deals listed in the table have been announced but have not necessarily closed.

Betting on the business model



It isn't just what major biopharmas are buying that matters. What they are selling also sets the tone. As overall success is linked to the ability to deliver better, more personalized outcomes, life sciences business models are changing. As a result, companies are divesting assets that are no longer core to growth – or may soon fall into that category.

Currently, most life sciences products and services can be classified into four different categories:

1. **Breakthrough innovator:** Best-in-class products that are primarily paid for by health insurance
2. **Disease manager:** Products and solutions to manage chronic conditions end to end
3. **Efficient producer:** Lower cost products and services that perform as well as the competition
4. **Lifestyle manager:** Health maintenance products and services that are sold directly to the consumer and paid for directly by them

At an operational level, the biggest companies have products that fit into at least two or three, if not all, of these product categories. But as companies invest in new tools and technologies that allow them to respond to the changing and expanding demands of their customers, they can't afford to invest the human and financial capital in capabilities that give them the appropriate depth across all these different categories.

Breakthrough innovators, for instance, will want to disproportionately invest in data-centric technologies that accelerate costly aspects of development. These include clinical trial recruitment and monitoring. They will also want to finance approaches that may amplify or supersede existing therapies. Disease managers, in contrast, will get more value out of tools that improve the individual experience or use data to improve adherence to a specific intervention.

In essence, in addition to narrowing the therapeutic focus, future success may also require additional business model specificity. That's a subject David Wright, CEO of HRA Pharma, has been thinking about since he took over that position in 2017.

"Our commercial structure was a legacy of our past portfolio ... I wanted to create a responsive, asset-light corporate structure that we could scale up – or down – as needed." (See "Creating a flexible operating structure to optimize growth," by David Wright.)



Creating a flexible operating structure to optimize growth

David Wright, Chief Executive Officer, HRA Pharma

HRA Pharma originated in the 1990s as a specialty pharmaceutical company focused on therapies in women's health and endocrinology. It evolved into a consumer-focused business after two prescription emergency contraceptives were reclassified as over-the-counter medicines. In 2015, Astorg, a French private equity firm, and Goldman Sachs purchased HRA Pharma.

It's an interesting time to be the CEO of a company developing and selling consumer health care products. E-commerce companies such as Amazon and Alibaba have used the principles of simplicity and accessibility to create dominant positions in the market. The way consumers are looking at brands and buying health care is very different than it was 20 years ago. Pharmaceutical companies have only started to question the status quo; most continue to do business in the same way they always have.

When I became CEO of HRA Pharma in 2017, the company faced a fundamental challenge. Our business was selling over-the-counter products, but our commercial structure was R&D heavy, focused on developing prescription medicines using an internally owned sales force. Simply put, our structure and processes no longer aligned with our business model.

I wanted to create a responsive, asset-light corporate structure that we could scale up – or down – as needed. My goal was to change our global commercial model, both how we sold to pharmacies and the mass market, to an outsourced model that relies on third parties for all our sales and merchandizing activities. We have also outsourced logistics to different players depending on the geographical location, as well as manufacturing and R&D. The end result: HRA is now asset-light, using partners at every stage of the product life cycle.

Companies have used this model in smaller countries when expanding operations or when they have so called "tail brands" that don't require the same level of investment. Companies choose to outsource these brands to other companies to focus on core priorities. The reality is you can do this strategy in big markets or within your own portfolio. But you must be clear about the execution plan and have the will to drive that philosophy through the organization.

Partnering for growth

We're relatively small, with just 280 full-time employees. But we have a big portfolio built on partnering. Our goal is to be one of the top 15 consumer health care companies globally, up from 178th a few years ago. Already our revenue has increased from US\$80 million in 2016 to more than US\$500 million with an EBITDA in the mid-30s.

An early catalyst was our purchase of Compeed, a brand of hydrocolloid gel plasters for treating blisters and other wounds, from Johnson & Johnson. This is a brand that is extremely strong across Europe. While it didn't fit seamlessly with our historic focus in emergency contraception, it nevertheless moved the goal posts for HRA, giving us greater mass in our desired channels.

The way consumers are looking at brands and buying health care is very different than it was 20 years ago.

That reach is critical in the consumer business. In today's world, I don't think it necessarily matters which therapy areas the products fall in, as long as they are category-leading brands with revenue-leading positions. I am more interested in building a portfolio of brands that are number one or two in their categories. That is the way to create value.

In addition to in-licensing top brands, I am also focused on adding digital expertise. Given our current portfolio, I believe we can reach the consumer more quickly and cheaply using new digital tools rather than with traditional communication channels.

Digitally based services are important too. What the consumer values is not just a cream or a patch or a liquid. The holistic offering is what matters, including the educational information, and the additional services that promote adherence. It might also be a diagnostic that monitors the individual's health and wellness – there's a lot of mileage still in that area.

As we continue to execute on our consumer health care model, we have the key components in place. But we will continually adapt our tools, with an eye to creating systems that allow flexibility, speed and agility.

Although empirical evidence linking outperformance to exact business archetypes is still lacking, we believe this type of prioritization will drive future success. It also has important M&A implications for companies. In addition to prioritizing products or services that add depth in a given therapy area, companies may also want to make sure these same assets align with the company's chosen commercial model. In doing so, companies can invest in the organizational capabilities and data required for increased market penetration, while eliminating execution challenges.

2019 deal activity suggests many companies already believe there are advantages in prioritizing one business model over another. Pfizer's decision to spin-off its established products division, which includes legacy brands such as Viagra and Lipitor, is an example of the trend. The move comes one year after the big pharma announced it would divest its consumer products group in combination with GlaxoSmithKline.

Sanofi, meanwhile, announced in December 2019 that it was exiting diabetes and cardiovascular R&D and narrowing its portfolio to focus on its strongest-growing products. The decisions by Pfizer and Sanofi to further trim their portfolios is an important bellwether. Will other companies also reduce their product offerings to fully embrace the role of breakthrough innovator?

If they do, private equity groups, which have significant financial capital to deploy, will likely be interested in creating new companies with the deprioritized assets. As Julia Kahr, Senior Managing Director of The Blackstone Group, sees it, the need to be efficient with capital isn't new but has taken on greater urgency as companies devote more resources to their highest pipeline priorities. Companies "have no choice but to put to the side products that might have high potential but are no longer their core focus," she says. (See "Pharma's growing need for efficiency creates new opportunities for private equity," by Julia Kahr.)



Pharma's growing need for efficiency creates new opportunities for private equity

Julia Kahr, Senior Managing Director, The Blackstone Group

At the highest level, our investing lens is focused on opportunities to improve the efficiency of the development, production and delivery of health care products to patients, thereby achieving the dual objective of reducing the cost and improving patient outcomes. As it relates to pharma, we see opportunities across the value chain, from development, to manufacturing scale-up to commercialization and the use of companion diagnostics to better target patients for whom the drugs will work.

On the development side, big pharma companies are under increasing pressure to be efficient, as their R&D budgets have remained largely static while the cost of developing a single drug has continued to escalate. (Indeed, the average cost to develop a new molecule is now estimated to be north of US\$2.5 billion.) Factors contributing to the increase in drug development cost include increased clinical trial complexity, requirement for larger clinical trial sizes and duration, and a greater focus on addressing more complex degenerative diseases with more specific, targeted therapies.

As pharma companies dedicate more resources to their highest pipeline priorities, they have no choice but to put to the side products that might have high potential but are no longer their core focus. This reprioritization creates numerous opportunities for a private equity firm with our depth and expertise. We have multiple pockets of capital available to invest in health care businesses, regardless of the stage and maturity of the assets, from development-stage through to large, mature businesses.

One recent example is our partnership with Ferring Pharmaceuticals to create a new company called FerGene, with a dedicated focus on the global development of, and US commercialization of, the novel gene therapy Ferring has developed for bladder cancer. Ferring and Blackstone Life Sciences will be investing jointly more than US\$500 million to fund this company.

On the manufacturing side, the scientific advances in cell and gene therapy, with several recent product approvals and many more expected in the near future, create a real need for specialized cell and gene manufacturing infrastructure. Many of the late-stage cell and gene therapy products have been developed by small and emerging biopharma players who do not have large-scale manufacturing expertise or capital. We believe there will be numerous opportunities to invest behind the scale-up of underlying infrastructure to support cell and gene therapy manufacturing and the supply chain through to the patient.

As we work with potential partners across the pharma ecosystem, the ability to retain upside while simultaneously accelerating the pace of drug development and improving patient outcomes creates a compelling value proposition.

On the diagnostics side, the ability to pair next-generation sequencing (NGS) technology with drugs is also of great interest to us. As the cost of NGS continues to fall, we believe the technology will be used increasingly not only to improve the efficacy of drugs but also to determine which courses of treatment have the highest likelihood of success for a given patient's genetic makeup.

Partnering for mutual benefit

We partner with pharma companies in a number of different ways. There is no one size fits all. The type of deal we structure depends on the corporate partner's objectives, so we begin by sitting down to discuss and better understand their specific needs. How much of the business does the partner want to keep? Is the preference for a deal that is on – or off – the balance sheet? Is the ability to buy the asset or company at a later date important to the partner? How much more capital is required to build out and grow the business?

Our addition of Clarus to the Blackstone family in 2018 (now called Blackstone Life Sciences) provides us with significant drug development expertise. Blackstone Life Sciences targets highly innovative medicines with the potential to save lives or improve patients' quality of life. This includes investments in biopharmaceutical products, medical devices, diagnostics and health care data science – from clinical stage to commercialization. This means we can create tailored solutions for our corporate partners that include mature portfolios of products as well as large pipeline assets.

The funding gap created by the rising cost of drug development has also created an opportunity to provide capital to "orphaned" public companies that have gone public but do not have the scale to raise the incremental capital required to fund the remainder of their drug development. We can help them with growth capital to fund their own drug development or strategic acquisitions of other assets.

As we work with potential partners across the pharma ecosystem, the ability to retain upside while simultaneously accelerating the pace of drug development and improving patient outcomes creates a compelling value proposition. That's a win for everyone in today's capital-constrained environment.

What's ahead in 2020



The forces driving 2019 M&A activity will continue to be major drivers of deals in 2020 as well. Although life sciences companies deployed US\$200 billion in Firepower in 2019, as an industry, more than US\$1 trillion remains available for deals.

At the subsector level, both medical technology and big biotech companies have ample Firepower, not least because companies in these two domains deployed so little of it in 2019 (16% and 10% respectively). That could translate into robust dealmaking as shown in Figure 8 and “Predictions for 2020.”

For the last several years, investors and analysts have predicted that big biotechs would become more active dealmakers. 2020 may well be the year companies in this subsector buy – or are bought. EY analysis of 23 biopharmas suggests that 10 have acute future growth gaps, in which the current growth gap is at least 10% of the company’s 2023 sales forecast. Four of the five big biotechs in our data set fall into this category.

Predictions for 2020

- ▶ All drivers point to a need for increased dealmaking but M&A deal totals are highly unlikely to reach 2019 levels.
- ▶ To exceed US\$200 billion, the recent normal M&A total, requires significant megamerger activity.
- ▶ Big pharma companies will continue to exit deprioritized therapy areas to focus on not just specific therapy areas but a particular business model.
- ▶ Medtech companies will be more active dealmakers, especially if target valuations moderate.
- ▶ Big biotechs will step up their dealmaking as growth challenges become too acute to ignore.
- ▶ Cell and gene therapy companies will continue to be top acquisition targets.

Figure 8: Dealmaking drivers point to active climate in 2020



 Impact on 2020 dealmaking activity

Given these acute growth gaps, what's striking is biotechs' tendency to return cash to shareholders rather than undertake M&A. Consider that in the first half of 2019, big biotechs spent just 9% of their total capital allocation on inorganic growth. Such behavior may please shareholders in the short term, but it has long-term downsides, suggesting companies are uncertain about how best to invest for future growth. (See Figure 9.)

Market volatility and the need for focus create more opportunities for deals

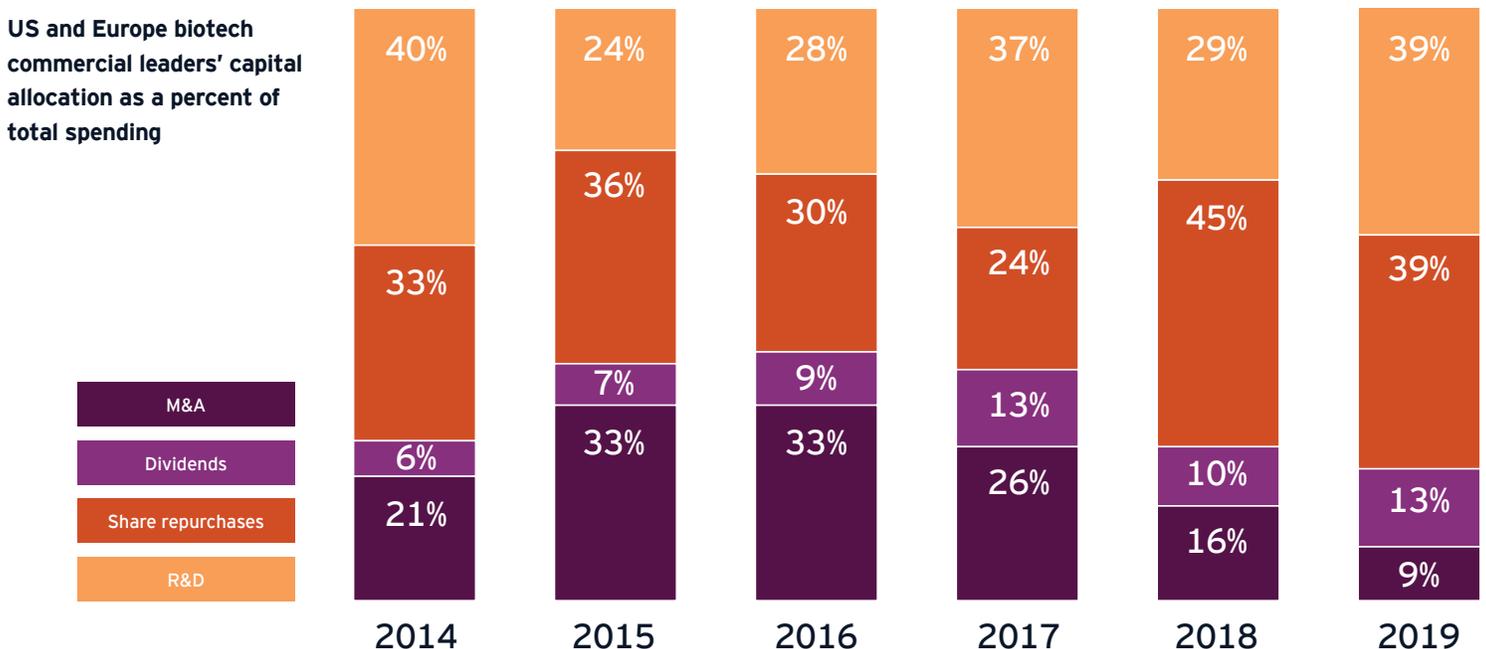
Volatility in the biotech sector seems likely to continue in 2020. As the US heads into an election year, talk of drug pricing reforms will grow louder, creating uncertainties for companies developing premium-priced products. Also, companies that were able to tap the public markets early in their growth trajectories, especially cell and gene therapy and immuno-oncology startups (such as Sarepta Therapeutics, bluebird bio and Collectis), have experienced growing pains. At times, investors have penalized the entire field.

From July to November 2019, for instance, investors' concerns shaved roughly US\$12 billion in market value from 26 gene therapy startups. If valuations for these startups remain volatile, interested acquirers may again attempt to broker deals. (See "Spotlight on cell and gene therapy.")

And it isn't just cell and gene therapy companies that could be targets. An analysis of more than 100 small- and mid-cap biotechs shows that as of 30 November 2019, 60% were trading at a discount relative to their trailing 52-week averages; within this cohort, the share prices of 52% had fallen 20% or more. Even some of the biggest biotechs were trading as much as 20% below their yearly highs. As was the case in the BMS/Celgene deal, such discounts create buying opportunities for big pharma companies hungry for new modalities or additional therapeutic depth.

This desire to deepen therapeutic focus will continue to be an important deal catalyst in 2020. Despite recent acquisitions, no single biopharma company holds more than 5% share of total market revenue, and half of the companies in our data set still meet the criteria of being less therapeutically focused.

Figure 9: In 2019, big biotechs have returned cash to shareholders at the expense of M&A



Sources: EY and Capital IQ. 2019 data are through 30 June.

Based on five-year compound annual growth rates and therapeutic focus, 12 companies fall into the most acute category of all – less focused and lower growing. (See Figure 6.)

As the commercial scene grows more complicated, we believe it will become more difficult for companies with therapy area market share in the low single digits to differentiate their products to health stakeholders. EY analysis suggests that if companies that are sub-scale in just five therapy areas – oncology; cardiovascular and metabolic disease; immunology; infectious disease; and central nervous system disorders – were to optimize their portfolios, there is the potential for nearly US\$300 billion in dealmaking, with no megamergers required. Divesting other deprioritized businesses – for instance, established brands or women’s health – could result in tens of billions of additional M&A opportunities as well. (See Figure 10.)



Figure 10: The total M&A value of portfolio optimization in five therapy areas exceeds US\$285 billion

	Oncology	Cardiovascular/ metabolic disease	Immunology	Infectious disease	Central nervous system disorders
Aggregate revenues of sub-scale assets	US\$14 billion	US\$11 billion	US\$3 billion	US\$9 billion	US\$23 billion
Potential deal multiple	6.0x	4.0x	5.0x	3.0x	5.0x
Potential asset value	US\$84 billion	US\$44 billion	US\$15 billion	US\$27 billion	US\$115 billion
~US\$285 billion					

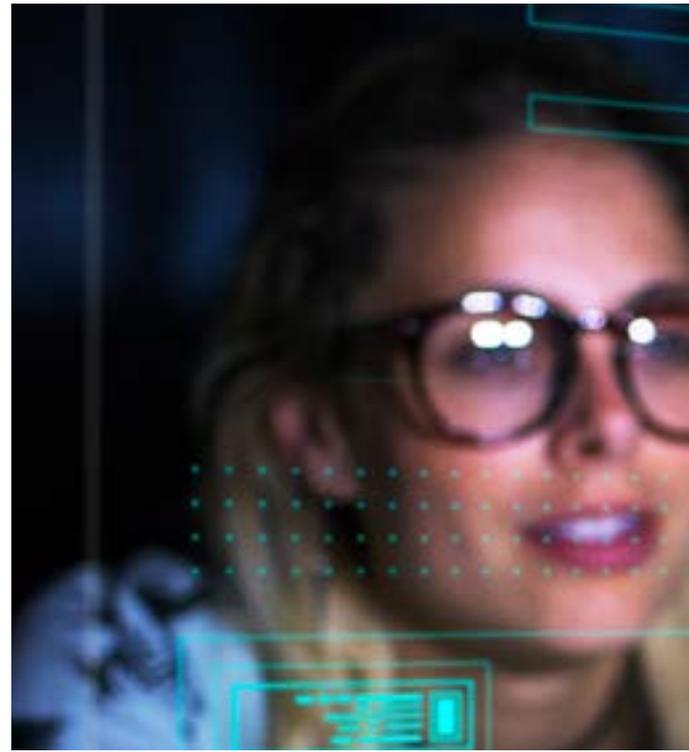
Sources: EY, Capital IQ and EvaluatePharma. Modeling assumes assets are divestiture candidates if owners’ revenues total 3% or less of total therapy area revenues. Revenue multiples were determined as described in the “Methodology.”

To continue the record-setting M&A trajectory, companies outside big pharma must return to the dealmaking table and make transformative bets of their own.

It will be interesting to see if companies extend their portfolio pruning to oncology. Given oncology's historic growth and comparatively healthy reimbursement levels, many big biopharmas will be loathe to exit it even if they don't have critical market share. Instead, they may hold on to products in the hopes of creating an oncology powerhouse from one or two blockbuster launches. That's the strategy Merck used with Keytruda, for instance. The trouble is, as the number of competing products in oncology expands, demonstrating true clinical differentiation becomes more difficult. Without that differentiation, it is easier for payers and providers to require outcomes-based payment models or limit patient access, both of which could limit growth potential.

A record-breaking 2020?

Ninety-four percent of respondents in our September 2019 dealmaker survey expect to see an increase or at least no change in M&A activity in the next 12 months. Whether or not the dealmaking total exceeds US\$200 billion, which we have considered the normal benchmark since 2015, depends on the level of megamerger activity and whether big biotech and medical technology companies increase their M&A.

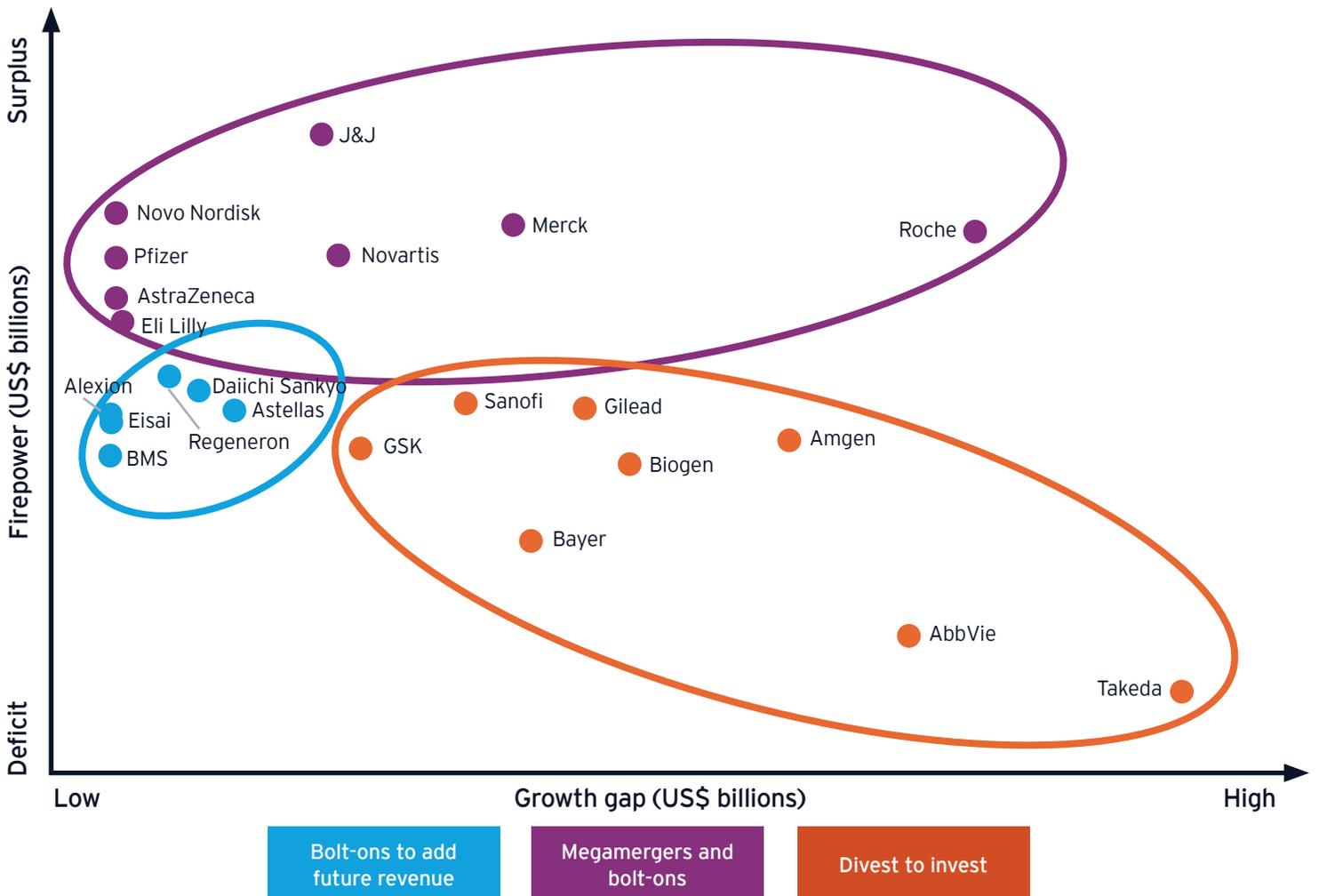


An analysis suggests that a majority of top biopharmas have sufficient Firepower to do bolt-on deals and roughly one-third of them have the resources for megamergers. However, of the companies likeliest to pursue megadeals, Roche, Novartis and Merck have publicly stated a desire to avoid them. Executives at these companies are confident about their organic growth prospects and prefer to supplement revenue through smaller deals. They are convinced that large deals destroy shareholder value either because buyers overpay or because megamergers result in a poor strategic fit that limits upside.

To continue the record-setting M&A trajectory, companies outside big pharma must return to the dealmaking table and make transformative bets of their own. After a year of aggressive purchasing, it would not be surprising if big pharma companies paused their M&A, either to focus on integration or further portfolio optimization. (See Figure 11.)



Figure 11: Potential 2020 dealmaking activity based on Firepower and growth gaps



Sources: EY, Capital IQ and EvaluatePharma.

The innovation agenda



Over the past two decades, access to external innovation has become essential to life sciences companies' growth. As outlined in the recent report, *Externalizing pharma innovation is the winning strategy* — now more than ever, biopharma companies are less efficient at bringing new drugs to market than their smaller counterparts, spending more per approved product. Moreover, the value contribution from acquired pipeline drugs has continued to rise since 2014, especially in new modalities such as cell and gene therapy.

With deal premiums still rich, companies must think beyond M&A to how they can use partnerships and other models of external innovation to more affordably build capabilities and avoid disruption. The big biotechs, Gilead and Regeneron, for instance, announced broad partnerships with Galapagos and Alnylam respectively to license valuable development-stage assets. These collaborations both came with M&A-sized deal values but the price tags were a fraction of what it would have cost to buy the partners outright.

The analysis suggests that companies are using alliances, partnerships and collaborations to validate risky, still unproven modalities before putting too much capital to work. Indeed, 25% of the bolt-on transactions announced in 2019 were between companies that had previously partnered. That is a 14 percentage point increase from 2015.

Bayer's acquisition of BlueRock Therapeutics is an example of the "teaming" trend. Stefan Oelrich, Member of the Board of Management and President of the Pharmaceuticals Division at Bayer AG, believes in identifying promising early-stage assets and collaborating before M&A when possible. His preference in many cases is "to begin by collaborating and working closely with a partner, before extending the relationship to a full rights management or even an acquisition, if it fits." (See "Translating external innovations into market breakthroughs," by Stefan Oelrich.)

This "try-before-you-buy" attitude isn't surprising and may alleviate cultural fears for both the buyers and the sellers. It may also help reduce execution risks. In the past, bigger biopharmas have lost value by acquiring platform technologies too early — either because they weren't able to integrate the innovative company into their corporate structure or because developing actual therapeutics proved more difficult than anticipated.

Spotlight on cell and gene therapy

EY analysis of cell and gene therapy-driven M&A activity shows a massive increase from just five years ago.

In 2014-15, companies spent US\$5 billion to acquire cell and gene therapy startups; in 2018-19, the M&A dollars increased 880% for a combined two-year total of US\$49 billion. If anything, the dollar total underrepresents the allure of cell and gene therapies since it is limited to bolt-on transactions.

The M&A focus on cell and gene therapy will continue in 2020. One reason is that pharmaceutical companies appear to want to learn from the past. A decade ago they realized they did not have access to critical biologics products or know-how precisely when the business model shifted from primary care drugs to specialty-focused products. They played catch-up using M&A.

Determined not to miss out on the next wave of innovation, these same companies are accelerating their cell and gene therapies investments. They believe these medicines, which promise increased therapeutic precision and potentially curative outcomes, are transformative not just for patients but also for their businesses.

An analysis of the numbers shows the M&A momentum began in 2017 with the launch of two novel CAR-T products, Novartis' Kymriah and Kite's Yescarta. Just months later, Gilead acquired Kite for nearly US\$12 billion, the beginning of buying trend in the space. In 2018, Sanofi, Celgene and Novartis purchased cell and gene therapy startups; in 2019, Roche, Astellas, Biogen, Bayer and Bristol-Myers Squibb followed suit. Medtechs haven't ignored the trend either, seeing an opportunity to improve the manufacturing process.

Because cell and gene therapies represent a step change in efficacy, they also have unprecedented pricing (at least for now). But while the therapies are transformational, they are still recognizable life sciences products. Thus, because potential buyers can use traditional methods to calculate their value, and know how to sell them, they feel confident spending large dollar amounts to acquire them.

That isn't the case for digital technologies – and that has made life sciences companies more cautious buyers. Longer term, however, companies will need to make digital tools a focus if they are to realize the possibilities in personalized health that cell and gene therapies have revealed.

M&A activity in the cell and gene therapy market (2014-19)



Sources: EY, Informa's Strategic Transactions. 2019 data through 30 November. M&A activity represents bolt-on transactions by life sciences companies but does not include megamergers that included cell or gene therapy products.

The value of digital

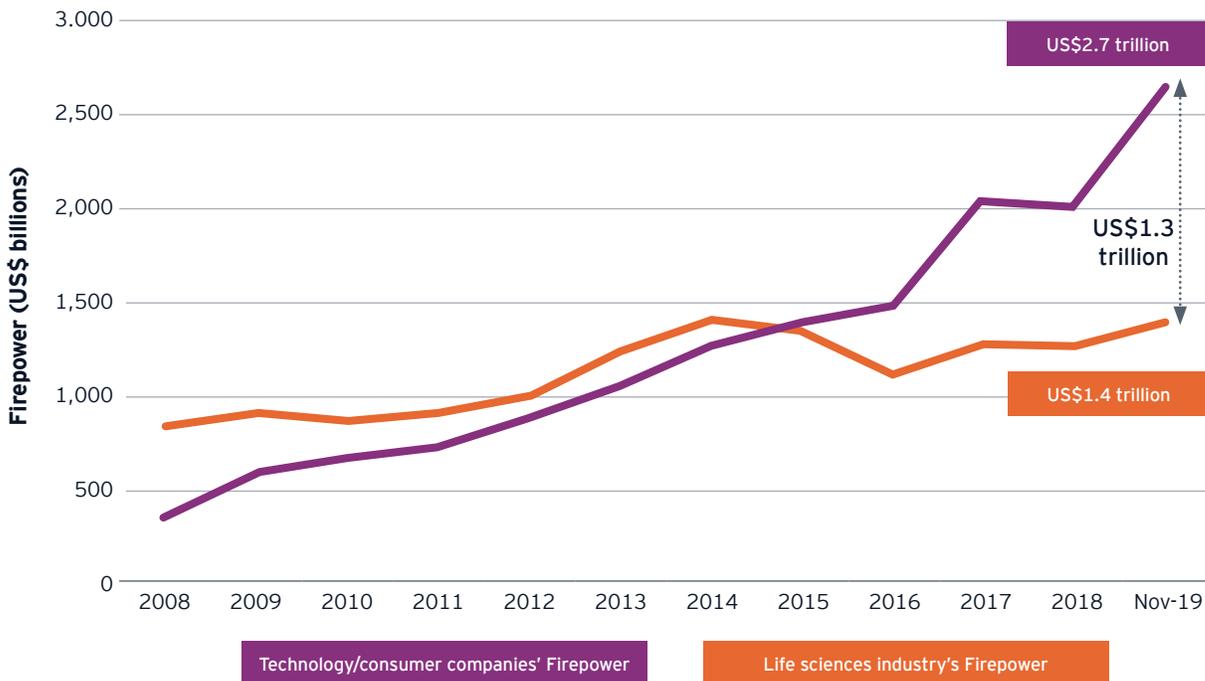
To really position themselves for future growth, life sciences companies must also invest in technologies that complement traditional product-centric definitions of innovation, including data analytics, user-centered design and product personalization. In the near-term, alliances will be the primary mechanism life sciences companies use to obtain these skills. That is because, in many cases, accessing these capabilities requires partnering with new entrants that are not themselves acquisition targets and have sufficient Firepower of their own. (See Figure 12.)

Certainly, outside of Roche's acquisition of Flatiron Health in 2018, biopharmas have not rushed to acquire digital technologies. (See Figure 13.)

That's partly because the ROI remains theoretical. But it's also because the valuation mechanisms used to assess traditional products don't necessarily apply. First, the value of these digital capabilities is difficult to link to a single pharmaceutical or device product. Second, because of the exponential nature of these technologies, financial models that rely on net present value may overinflate the near-term costs and underestimate the ultimate return.

Studies show that early in the adoption cycle, the pay back for these technologies is small and characterized by unfavorable returns. However, at some point, the returns increase so much that growth becomes almost vertical, looking like a "J curve" on a time series graph.

Figure 12. Ten technology and consumer companies have US\$1.3 trillion more for dealmaking than life sciences companies



Sources: EY and Capital IQ. Analysis through 30 November 2019. Analysis excludes adjustments to Firepower related to recent dealmaking. The Firepower of big pharma, specialty pharma, biotech and medtech companies is used to calculate the life sciences industry's Firepower. The companies in the technology and consumer cohort are Alibaba, Alphabet, Amazon, Apple, Comcast, Facebook, IBM, Intel, Microsoft and Qualcomm.

The danger for life sciences companies is that they will stop investing before reaching the exponential growth phase that makes it possible to deliver on the technology's potential and lose out on innovations that will be critical drivers of future growth.

Dealmakers we surveyed are aware that there is a pressing need to consider new valuation approaches. In our September 2019 life sciences dealmaker survey, 66% of executives "agreed or strongly agreed" that traditional valuation methodologies make it difficult to properly ascertain the worth of acquisition targets.

Moving forward, there is no doubt that M&A will continue to be an important tool for shoring up near-term growth. At the same time, partnership models that provide competitive access to data-centric and commercial skills allow companies to remain agile and move quickly into high-growth areas.

As the pace of change accelerates, balancing these twin ambitions will become ever more important. As Louis Pasteur noted more than 150 years ago, "chance favors only the prepared mind." The same could be said for astute life sciences dealmakers.

Figure 13: Selected examples of organizations using deals to obtain new skills

2018		2019			
January 2018	February 2018	February 2019	February 2019	April 2019	May 2019
Allscripts + Practice Fusion	Roche + Flatiron Health	Geisinger Health Plan + RxAnte	Johnson & Johnson + Auris Health	AstraZeneca + BenevolentAI	Roche + GE Healthcare
Acquisition	Acquisition	Alliance	Acquisition	Alliance	Alliance
Health IT	Health IT	Software apps	Digital surgery	AI-based discovery	Health IT
March 2018	April 2018	June 2019	June 2019	July 2019	July 2019
Philips + Samsung	Novartis + Pear Therapeutics	Siemens Healthineers + Mentice	Sanofi + Alphabet	Bayer + Sensyne Health	Medtronic + Viz.ai
Alliance	Alliance	Alliance	Alliance	Alliance	Alliance
Health IT	Software apps	Virtual reality	Software apps	Software apps	Software apps
October 2018	November 2018	Oct 2019	Oct 2019	Oct 2019	Nov 2019
Novo Nordisk + Flex	Merck KGaA + Palantir	Novartis + Microsoft	Novo Nordisk + Noom	Gilead Sciences + Glympse Bio	Baxter + Ayogo Health
Alliance	Joint venture	Alliance	Alliance	Alliance	Alliance
Platform creation	Cancer research	Software apps	Software apps	Machine learning	Software apps

Sources: EY, company reports.

Methodology



Dealmaking analysis

Life sciences M&A activity was analyzed from 1 January 2014 to 30 November 2019 using data from Capital IQ. Deals were categorized according to the acquirer's subsector (e.g., big biotech, big pharma, specialty pharma/generics, and medical technology and life sciences tools companies) and by rationale as follows:

- ▶ **Asset swap:** transaction in which the companies participate as both acquirers and sellers, negotiating the exchange of assets with each other.
- ▶ **Bolt-on:** small to medium-sized acquisitions that account for less than 25% of the buyer's market capitalization.
- ▶ **Financial deal:** characterization used when the acquirer is a financial buyer (e.g., private equity) outside the life sciences industry.
- ▶ **Geographic expansion:** acquisitions by a life sciences company specifically designed to access capabilities in a new geography. This does not include cross-border transactions that are part of larger, transformative transactions.
- ▶ **Transformative M&A/megamerger:** deal meets one of two criteria: deal is greater than US\$10 billion in deal value or affects more than 50% of either company's market capitalization. Megamergers are a subset of transformative M&A deals with valuations of at least US\$40 billion for biopharmas and US\$10 billion for medical technology companies.

Growth gap and Firepower analyses

To determine the urgency to do deals at the company and industry level, EY researchers measured the **growth gap**. This gap is the difference in US dollars of a company's sales growth relative to the overall growth in market sales. This growth gap is defined to be **acute** if the value exceeds 10% of a company's annual revenue.

For biopharma companies, IQVIA's global drug market forecast and EvaluatePharma's company sales forecasts were used to determine the growth gap. For medical technology companies, the growth gap was calculated using global medtech market estimates and company sales per *Evaluate MedTech*. 2019 growth gaps were assessed as of 30 November 2019.

EY defines **Firepower** as a company's capacity to fund transactions based on its balance sheet. It has four key inputs: 1. Cash and equivalents; 2. Existing debt; 3. Debt capacity, including credit lines; and 4. Market capitalizations. The following assumptions underpin the analysis:

- ▶ A company will not acquire targets that exceed 50% of its existing market capitalization.
- ▶ When a transaction results in a new company, the debt-to-equity ratio of the combined entity cannot exceed 30%.
- ▶ Equity is measured on a market value basis.
- ▶ The methodology does not calculate the ability to perform M&A via stock-for-stock transactions. However, increases in a company's stock price do increase a company's Firepower because increased equity enables companies to borrow more to finance transactions.

Firepower trends are measured across the big pharma, big biotech, medtech and specialty pharma/generics subsectors, as well as across a subset of technology and consumer companies. While some life sciences companies have made acquisitions that extend beyond the upper threshold defined in the Firepower methodology, the goal is to create a uniform approach to measure relative changes in Firepower. As such, EY defines **deployed Firepower** as the ratio of capital spent on M&A by a company or subsector in a given period relative to the available Firepower as determined by the four inputs described above.

Unless otherwise noted, 31 December data were used to calculate annual Firepower results; for 2019, results were analyzed through 30 November 2019. In instances where transactions by companies in two different subsectors took place, Firepower calculations were performed for the separate entities until the close of the transaction.



The life sciences companies included in the 2019 EY Firepower Index are:

Big pharma:

- ▶ AbbVie Inc.
- ▶ Astellas Pharma
- ▶ AstraZeneca PLC
- ▶ Bayer AG
- ▶ Bristol-Myers Squibb Co.
- ▶ Daiichi Sankyo Co. Ltd.
- ▶ Eisai Co. Ltd.
- ▶ Eli Lilly and Company
- ▶ GlaxoSmithKline PLC
- ▶ Johnson & Johnson
- ▶ Merck & Co. Inc.
- ▶ Novartis AG
- ▶ Pfizer Inc.
- ▶ Roche Holding AG
- ▶ Sanofi
- ▶ Takeda Pharmaceutical Company Ltd.

Big biotech:

- ▶ Alexion Pharmaceuticals Inc.
- ▶ Amgen Inc.
- ▶ Biogen Inc.
- ▶ BioMarin Pharmaceutical Inc.
- ▶ Gilead Sciences Inc.
- ▶ Incyte Corp.
- ▶ Novo Nordisk A/S
- ▶ Regeneron Pharmaceuticals Inc.
- ▶ Seattle Genetics Inc.
- ▶ Vertex Pharmaceuticals Inc.

Specialty pharma/generics:

- ▶ Alkermes PLC
- ▶ Allergan PLC
- ▶ Bausch Health Companies Inc.
- ▶ Endo International PLC
- ▶ Indivior PLC
- ▶ Jazz Pharmaceuticals PLC
- ▶ Mallinckrodt PLC
- ▶ Merck KGaA
- ▶ Mylan NV
- ▶ Perrigo Company PLC
- ▶ Teva Pharmaceutical Industries Ltd.
- ▶ UCB SA

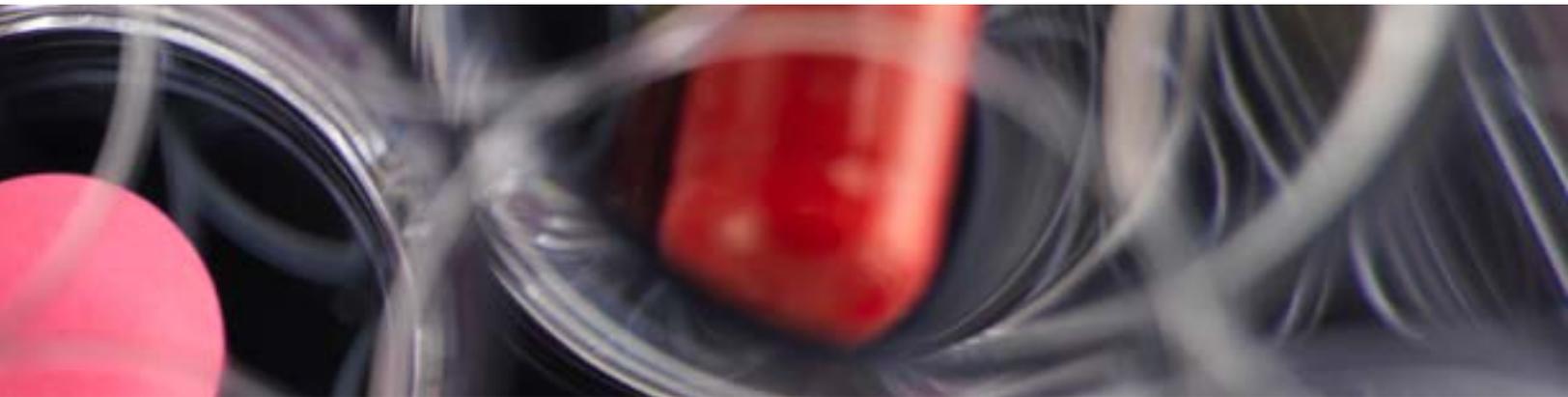
Medical device and life sciences tools companies:

- ▶ Abbott Laboratories
- ▶ Baxter International Inc.
- ▶ BD
- ▶ bioMérieux SA
- ▶ Bio-Rad Laboratories, Inc.
- ▶ Boston Scientific Corp.
- ▶ Bruker Corp.
- ▶ Dexcom, Inc.
- ▶ DiaSorin
- ▶ Edwards Lifesciences Corp.
- ▶ Haemonetics Corp.
- ▶ Hill-Rom Holdings Inc.
- ▶ Hologic Inc.
- ▶ Illumina Inc.
- ▶ Integra LifeSciences Holdings Corp.
- ▶ Intuitive Surgical Inc.
- ▶ Medtronic PLC
- ▶ Myriad Genetics, Inc.
- ▶ OPKO Health, Inc.

- ▶ OraSure Technologies, Inc.
- ▶ PerkinElmer, Inc.
- ▶ QIAGEN N.V.
- ▶ Quidel Corp.
- ▶ Smith & Nephew PLC
- ▶ Sonic Healthcare Ltd.
- ▶ Stryker Corp.
- ▶ Sysmex Corp.
- ▶ Teleflex Inc.
- ▶ Thermo Fisher Scientific Inc.
- ▶ Varian Medical Systems, Inc.
- ▶ Veracyte, Inc.
- ▶ Waters Corp.
- ▶ Zimmer Biomet Holdings, Inc.

Technology and consumer companies:

- ▶ Alibaba Group Holding Ltd.
- ▶ Alphabet Inc.
- ▶ Amazon Inc.
- ▶ Apple Inc.
- ▶ Comcast Corp.
- ▶ Facebook, Inc.
- ▶ Intel Corp.
- ▶ International Business Machines Corp.
- ▶ Microsoft Corp.
- ▶ Qualcomm Inc.



Biopharma performance and dealmaking analyses

The pharmaceutical portfolios of 23 biopharma incumbents were categorized as more focused or less focused based on the following criterion: companies that generated at least 50% of their biopharmaceutical revenues from one therapeutic area according to EvaluatePharma were classified as more focused; companies that didn't meet this threshold were classified as less focused. Importantly, the analysis was based on company biopharma revenues only, not total revenues.

The financial and operational performance of the more focused (n=10) and less focused (n=13) cohorts were analyzed across five metrics: EBITDA margin (five-year average); five-year compound annual growth rate; return on invested capital (five-year average); five-year total shareholder return; and average valuation.

To determine how dealmaking influenced growth prospects for biopharma companies, EY mapped companies based on their forecasted five-year compound annual growth rates from 2018-2023 and overall therapy focus. Pfizer's position in 2019 includes the proposed divestiture of its established products assets to Mylan. Unless otherwise noted, EvaluatePharma's estimated drug forecasts were used as the source for all sales figures. The future dealmaking activities of these companies were also assessed using Firepower and growth gap metrics as described above using Capital IQ and EvaluatePharma data through 30 November 2019.

Portfolio optimization and market valuations

To model the potential M&A activity that could result from portfolio optimization, EY researchers first analyzed the market fragmentation in five therapeutic areas: oncology; immunology and inflammation; cardiovascular disease; infectious disease; and central nervous system disorders (CNS). The analysis is based on the following assumptions:

- ▶ Assets were presumed to be candidates for portfolio optimization if company revenues in this therapy area totaled 3% or less of the total therapy area revenues based on 2023 EvaluatePharma forecasts.
- ▶ To determine potential revenue multiples in each of the therapeutic areas, precedent transactions since January 2015 were used to calculate average and median revenue multiples. To avoid skewing the results, the following types of transactions were excluded from this analysis: deals involving less than a 50% ownership stake; deals with enterprise value to revenue ratios of more than 25-fold.
- ▶ To establish the base case for deal values in each therapeutic area, median revenue multiples were rounded down to the lower whole number.

To assess the importance of target valuations in driving acquisitions, EY researchers first analyzed all life sciences transactions between January 2017 and 15 November 2019 to identify the public targets that were trading at a discount the day prior to an acquisition's announcement relative to the 12-month trailing average share price. Companies were segmented by the magnitude of the discount: up to 10%; 10%-20%; and greater than 20%.

The valuations of 142 possible small- and mid-cap biopharma acquisition targets were also assessed on 15 November 2019 to understand how changes in share price might affect dealmaking in 2020. The companies' closing share prices on 15 November were compared to the 12-month trailing average share prices and companies were segmented based on the magnitude of the discount or premium.

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Contacts



Pamela Spence
EY Global Health Sciences
and Wellness Industry Leader
pspence2@uk.ey.com
+44 207 951 3523
Twitter: @pamelaspence_EY



Ellen Licking
EY Global Health Sciences
and Wellness Lead Analyst
ellen.licking@ey.com
+1 408 283 5022
Twitter: @EllenLicking



Peter Behner
EY Global Health Sciences and
Wellness Transactions Leader
peter.behner@de.ey.com
+49 30 25471 12467



Jane Gray
EY UKI Life Sciences
Transactions Advisory Leader
jgray2@uk.ey.com
+44 782 509 9268



Ambar Boodhoo
EY Health Sciences and Wellness
Capital Efficiency Leader
ambar.boodhoo@ey.com
+1 212 773 9567



Klaus Ort
EY GSA Life Sciences
Transactions Advisory Leader
klaus.ort@de.ey.com
+49 61 96996 14977



John Babitt
Partner, Life Sciences,
Ernst & Young LLP.
john.babitt@ey.com
+1 612 371 1682



Takayuki Ooka
EY Japan Life Sciences
Transactions Advisory Leader
takayuki.ooka@jp.ey.com
+81 90 5792 3901



Elyse Deutscher
EY Global Transactions Advisory Services
Sector Resident, Life Sciences
elyse.deutscher@ch.ey.com
+41 58 286 8271



Krishnakumar Vaidyanathan
Life Sciences Transactions Advisory
Leader, India, Ernst & Young LLP
krishnakumar.v@in.ey.com
+91 22 61920950

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