
Supplementary information

Impact of COVID-19 on pharmaceutical external innovation sourcing

In the format provided by the authors

Supplementary Information | Data and analysis

All data used in this analysis was obtained from PitchBook Data, Inc. in August 2020, IQVIA Ltd Pharmadeals in August or September 2020 or EvaluatePharma® February 2020, Evaluate Ltd. Unless indicated otherwise, data reflects deals announced between February and July of each year in order to represent a uniform and relevant period of time.

Biomedical external innovation sourcing analyses (Figure 1 and Supplementary Figure 2)

The IQVIA Ltd Pharmadeals dataset was used to understand trends within the field of pharmaceutical innovation. The dataset includes transactions relevant to pharmaceuticals, medical devices, diagnostics, as well as biomedical research platforms for any deal conducted between private and public companies, universities, private-, government- and intergovernmental-funded research organizations and bodies worldwide. Our analysis focused on deals between February–July for the period 2015–2020. The full dataset included 11,905 deals, of which 4,333 deals had disclosed deal values (between 34.1–44.4% per year). Deal value analyses are restricted to transactions with financial data disclosed, and based on total deal value, i.e. is calculated as the total of any disclosed financial components of the deal, including any upfront payments, (future) milestone commitments, equity investment and additional funding. This is the maximum potential value of the deal. Given that >600 deals per observed timeframe of each year have disclosed values, calculation of median and cumulative deal values, as performed in Excel, appears statistically significant.

In order to focus specifically on the “innovation sourcing” aspect of deal-making, we excluded deal categories that are focused exclusively on commercial and manufacturing aspects, corporate reorganization or outsourcing.

Individual deal entries were processed, categorized and re-classified according to deal type, therapeutic area, product types and an additional, manually created category of COVID-19 related deals that was compiled based on keyword searches as well as thorough review of deal descriptions and manual re-classification; while the vast majority of these deals were grouped in the “Infectious diseases” therapeutic area, some were grouped within “Respiratory” and other therapeutic areas.

To explore the maturity of pipeline products included in deals, each deal was labeled with a distinct product phase reflecting the most developed phase mentioned for each deal. To clearly demonstrate early-stage versus late-stage focus, these categories were grouped as unknown, preclinical, pre-POC, post-POC or approved. This classification and related analyses were only applicable to ~70% of all deals; remaining transactions had no visible information on pipeline advancement status — either because they were phase-agnostic (e.g., innovation tools) or because detailed information has not been disclosed by the companies involved.

To assess the potential impact of megamergers (large M&A deals that have historically been major contributors to cumulative deal values in the pharmaceutical industry) on our analysis, we conducted an additional analysis in which we excluded the three largest deals of each year 2015–2020. The result suggests that the drop in cumulative deal value as seen in Supplementary Figure 2B is driven to a large extent by the absence of such megamergers between February 2020 and July 2020: excluding the top three deals in the dataset for each year (the range of which in each given year in USD billion was as follows: 2015: 40.5-17.0, 2016: 25.0-9.8, 2017: 24.0-7.2, 2018: 62.0-8.7, 2019: 63.0-11.4, 2020: 6.0-4.5) decreased the difference between the 2020 cumulative deal value versus 2015–2019 average to \$14 billion (12%) compared to \$68 billion (36%) when including these megamergers.

External innovation sourcing trend before 2020 (Supplementary Figure 1a)

The IQVIA Ltd Pharmadeals dataset was used to understand trends within the field of pharmaceutical innovation related deal-making before 2020. The dataset includes transactions relevant to pharmaceuticals, medical devices, diagnostics, as well as biomedical research platforms for any deal conducted between private and public companies, universities, private-, government- and intergovernmental-funded research organizations and bodies worldwide. In order to focus specifically on the “innovation sourcing” aspect of deal-making, we excluded deal categories that are focused exclusively on commercial and manufacturing aspects, corporate reorganization or outsourcing.

The deal sample for full years of 2015–2019 consists of 20,376 deals with 8,910 disclosed deal values (between 41.1–44.8 % per year). Deal value analyses are restricted to transactions with financial data disclosed, and based on total deal value, i.e. is calculated as the total of any disclosed financial components of the deal, including any upfront payments, (future) milestone commitments, equity investment and additional funding. This is the maximum potential value of the deal. Given that >1,600 deals per year have disclosed values, calculation of median and cumulative deal values, as performed in Excel, appears statistically significant.

Share of external innovation sourcing analysis (Supplementary Figure 1b)

To investigate the internal versus external sourcing proportion of industry’s output, EvaluatePharma® February 2020, Evaluate Ltd. data was analysed regarding the annual composition of total global biopharmaceutical revenue from NME-grade (New Molecular Entity and Biologic License Application) products. Revenues were consolidated depending on sourcing strategy employed by the company that realizes those revenues, into the following categories: partnered, acquired and organic. Revenues of co-developed products were assigned to groups based on the strategy of the respective company (that is, a partnered product might have a portion of revenues realized by its originator company contributing to the “organic” category, and the portion that is realized by in-licensor counted as “partnered”).

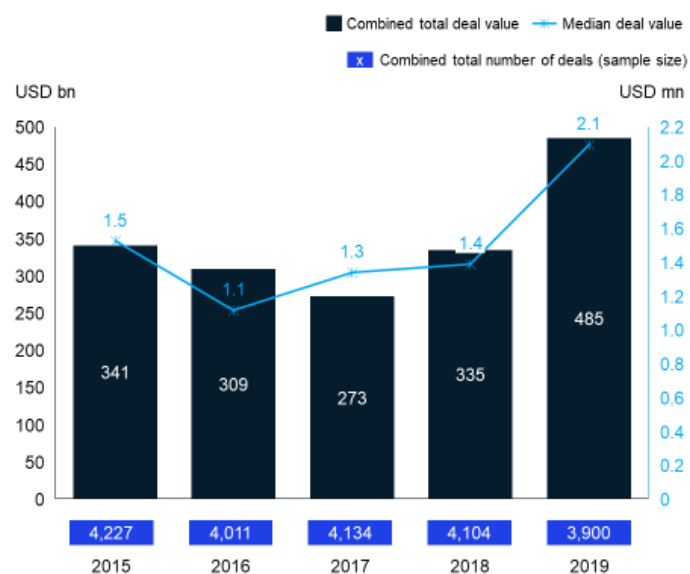
Pipeline origin for top 20 pharma companies

EvaluatePharma® February 2020, Evaluate Ltd. data was analyzed regarding the clinical pipeline of the top 20 pharma companies and segmented by origin as of February 2020. The top 20 companies were defined according to R&D spending. The pipeline was restricted to NME-grade (New Molecular Entity and Biologic License Application) products in phase I–III. Products co-developed by multiple companies were attributed to all relevant pipelines. The results suggest that ~45% of assets in the clinical pipeline from top 20 pharma companies are sourced via company acquisition, product acquisition, joint venture or in-licensing.

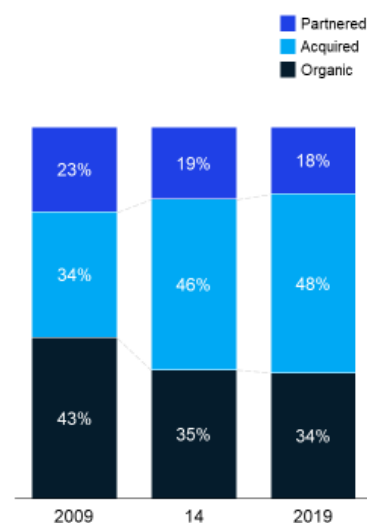
Biotech landscape investment analysis (Supplementary Figure 3)

To examine funding of early innovation in the start-ups and biotech ecosystem, further analyses using data from PitchBook Data, Inc. were performed (data has not been reviewed by PitchBook analysts). Data on number of transactions and invested capital includes private equity, venture capital, pre-venture capital, accelerators and incubators – data coverage on deals beyond private equity and venture capital might not be exhaustive as not all deals and deal details are disclosed. The available data was pulled for all industries and split by global and US deals. The total annual number of deals and cumulative invested capital were calculated for the timeframe from February to July, and 2020 activity was compared to the average activity in previous years (2015–2019). The overall number of financial transactions included in the analysis is 200,801.

A. Evolution of deal number and value

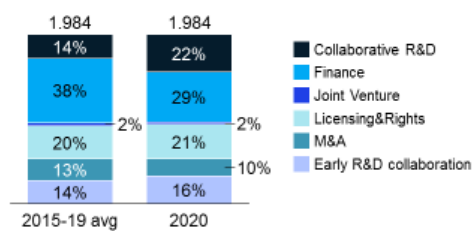


B. Revenue share by origin

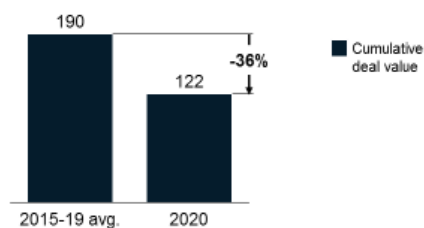


Supplementary Figure 1 | External innovation sourcing trend before 2020. **A** | Number of innovation-focused healthcare deals, combined total deal value (in US\$ billion) and median value per deal (in US\$ million) for 2015–2019. **B** | Annual industry revenue from NME-grade (New Molecular Entity) products by sourcing strategy (origin) as % of total revenue for 2009, 2014 and 2019. Data sources: IQVIA Ltd Pharmadeals; as of September 2020 for panel A and EvaluatePharma® February 2020, Evaluate Ltd for panel B.

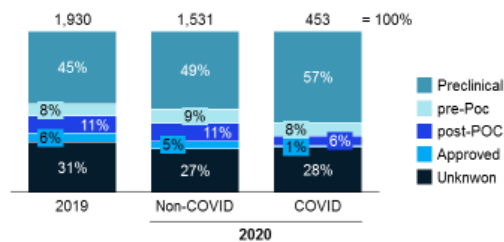
A. Number of deals by deal type



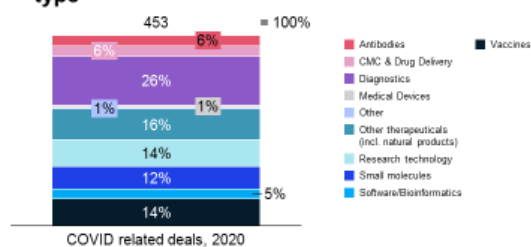
B. Cumulative deal value



C. Number of deals by product phase



D. Number of COVID related deals by product type



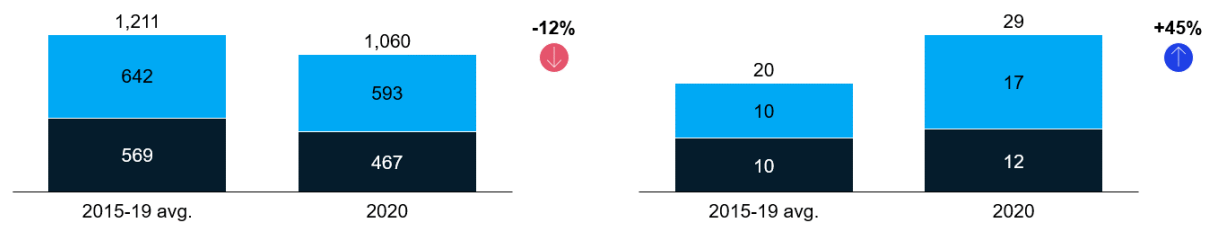
Supplementary Figure 2 | Deal-making trends in COVID-19-affected months as compared to the respective months of previous years. **A** | Number of innovation-focused healthcare deals by type, shown as % share of deals in February–July of 2015–2019 versus deals in the same period in 2020. Value on top of the chart represents February–July average for 2015–2019 and total number of deals in February–July of 2020, respectively. **B** | Cumulative deal value in February–July of 2015–2019 average versus the same period in 2020. **C** | Number of deals as % share by product phase (defined by the status of the most advanced product covered by the deal at the time of said deal) between February–July in 2019 versus the same period in 2020 (COVID-related and non-COVID-related; preclinical includes discovery). **D** | Number of COVID-related deals as % share between February–July 2020 according to product type of which antibodies, other therapeutics (including natural products) and small molecules comprise what we refer to as therapeutics. Data source: IQVIA Ltd Pharmadeals; as of August 2020.

Pharma and Biotech

■ US ■ Other

Number of deals, #

Invested capital, USD bn

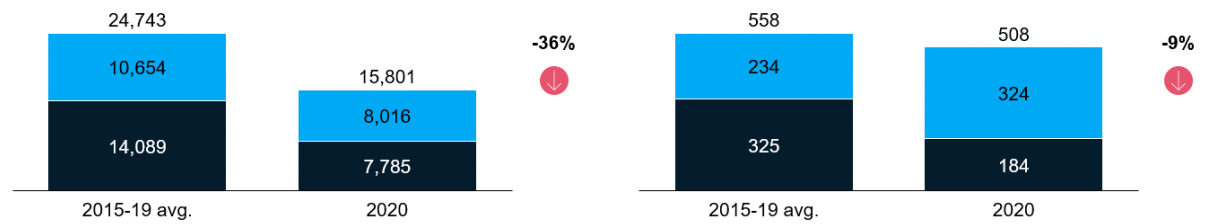


All industries combined

■ US ■ Other

Number of deals, #

Invested capital, USD bn



Supplementary Figure 3 | Combined private equity and venture capital deal count and invested capital for February–July 2015–2019 average versus February–July 2020. Data source: PitchBook Data, Inc. (data has not been reviewed by PitchBook analysts); as of August 2020.