Box S1 | **Data sources and methodology**

We conducted a set of outside-in analyses of pharmaceutical transactions and projected revenues from externally sourced products. We utilized data from EvaluatePharma® as of July 2014 (revenue forecasts and product originator data), IMS PharmaDeals® 2014 (information on historic merger and acquisition (M&A) and licensing deals), and CapitalIQ (company financials).

Pharmaceutical deal-making. Company-level analyses were performed for the top 20 innovator pharmaceutical companies based on Rx sales in 2013 as reported in EvaluatePharma®. The list includes the following companies: AbbVie/Abbott (these two companies were analyzed as a single entity to best account for pipeline continuity), Amgen, Astellas, AstraZeneca, Bayer, Bristol-Myers Squibb, Boehringer Ingelheim, Daiichi Sankyo, Eli Lilly, Gilead Sciences, GlaxoSmithKline, Johnson & Johnson, Merck & Co., Novartis, Novo Nordisk, Otsuka, Pfizer, Roche, Sanofi and Takeda. All the deal-making analyses were conducted for the time frame 2004 through to the first half of 2014.

In our analysis, we consider products that were first licensed from a company, and then acquired with that company as 'in-licensed' (based on the initial agreement). Products that were originally in-licensed by a company that was acquired are considered part of that acquisition (that is, the original licensing deal is not taken into account, as it was made by another entity). All products that were part of a megamerger deal are excluded (for example, products in-licensed by Genentech prior to its acquisition by Roche).

Peak sales forecasts. For the analysis of both M&A and licensing performance, we used 2023 as a reference year for commercial success. We recognize that there may be a bias in discounting older deals and weighting more-recent-vintage deals more heavily; the insights, however, continue to hold with little changes to company rankings when earlier reference years are used (for example, 2018).

Acquisitions 'efficiency'. The analysis includes all deals classified as mergers or business acquisitions according to IMS PharmaDeals® classification, with total deal value disclosed and exceeding \$0.1 billion. The analysis excludes megamergers (M&A events exceeding \$16 billion total deal value; for example, the Pfizer–Wyeth merger or Genentech's acquisition by Roche). Deals with no disclosed value were not taken into account in deal efficiency calculations. Also, deals that could not be directly linked to pharmaceutical products (for example, only pertaining to animal health, consumer products and so on) were excluded from the analysis. Compounds leveraging the discovery platforms of an acquired company, but originated after the acquisition was completed, are considered 'organic' in our analysis and hence excluded from the analysis. Revenue estimates obtained from EvaluatePharma® NPV Analyzer® 2023 were used to model revenue output from drugs acquired in a given set of transactions.

Acquisitions "efficiency" (FIG. 1a) was calculated for each company as:

$$\frac{\text{Total expected revenue in 2023 from drugs acquired externally from acquisitions}}{\text{Capital deployed in those acquisitions}}$$

Capital deployed is defined as the total amount paid upfront for all acquisition deals meeting the above-outlined criteria that were announced between 2004 and the first half of 2014. Novo Nordisk was excluded due to lack of relevant deals in the observed time-frame.

The amount of capital deployed has not been adjusted for inflation. Inflation adjustment results in minor changes in the Efficiency index value (<8%) and does not affect the relative ranking of companies.

Licensing 'hit rate'. For each of the top 20 innovator companies, we analyzed the proportion of 'blockbuster' and 'moderate win' deals, based on the projected 2023 revenues of products acquired in a given transaction. 'Blockbuster' deals are expected to generate 2023 revenue greater than or equal to $1 billion (the ten such deals in our sample are shown in Table S1), while 'moderate win' deals are expected to generate 2023 revenue in the range of $0.2 billion to just under $1 billion. Companies with fewer than 5 relevant deals are excluded from FIG. 1b. This analysis includes only the deals classified as licensing deals and option to license deals according to IMS PharmaDeals® classification; commercial/R&D alliances and other transactions are excluded.

Table S1 | **Blockbuster deals**

Licensee	Licensor	Lead asset	Stage at acquisition
J&J	Bayer HealthCare AG	Xarelto	Phase II
J&J	Pharmacyclics	Imbruvica	Phase III
GSK	Shionogi	Tivicay	Phase II
Sanofi	Regeneron Pharmaceuticals	Alirocumab	Phase III
Merck & Co.	Endocyte	Vynfinit	Phase III
Pfizer	Protalix	Elelyso	Registration
Roche	Chugai Pharmaceutical	Actemra	Phase II
BMS	Medarex	Yervoy	Phase III
Bayer	Regeneron Pharmaceuticals	Eylea	Marketed
Astellas	Medivation	Xtandi	Phase III