Balancing innovation and financial markets - Product-level evidence on drug sales contribution to fund R&D and Shareholder Payouts

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Motivation

Industry arguments about drug pricing have historically rested on the "blockbuster model", where revenue from a small number of high-selling products pays for the research and development of a broad portfolio, including the many candidates that fail or miss earning targets. Higher revenue from top-selling drugs is therefore expected to turn into R&D. The model was defined when $1 billion in annual sales was exceptional. Today leading firms report products that exceed that threshold significantly: Pfizer's Comirnaty reached $37.8 billion, Merck's Keytruda $25.0 billion and AbbVie's Humira $21.2 billion. Over the same period, dividends and stock buybacks have grown sharply. Most estimates of how R&D responds to revenue rely on firm- or industry-level totals, so they cannot show whether revenue from individual product categories is associated with different variables. We aim to understand whether revenue from blockbusters ($1–5 billion per year) and "super-blockbusters" (>$5 billion per year) is associated with R&D spending or with shareholder distributions.

Data and methods

We built a product-level panel of reported net sales for 20 large biopharmaceutical companies listed in Compustat (GICS 35201010 and 35202010) from 2000 to 2023. Product sales were extracted from 10-K and equivalent annual reports with a standardized large-language-model protocol and checked by hand against reported totals. Financial variables are sourced from Compustat. Each product-year is classified as super-blockbuster (top; >$5 billion), blockbuster (high; $1–5 billion) or non-blockbuster (low; <$1 billion, including product families reported only in aggregate). Classification is year-specific, so a drug moves between tiers as its sales change. We estimate two-way fixed-effects models on 419 firm-years:

$$Y_{it} = \beta_1\, top_{it} + \beta_2\, high_{it} + \beta_3\, low_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

where Y is shareholder payouts (dividends plus share buybacks) or R&D expense, and all variables are scaled by total assets. Robustness checks use different year lag modifications, bootstrapped standard errors and scaling by revenue.

Results

From 2000 to 2023 the 20 firms reported $11.6 trillion in revenue, $1.85 trillion in R&D expense and $2.03 trillion in net income. They paid $1.98 trillion to shareholders, which equals 97% of cumulative earnings, and more than they spent on R&D. Payouts exceeded R&D in every year from 2011 to 2019. More than 40 individual drugs crossed $5 billion in annual sales. Super-blockbuster product-years generated $1.5 trillion in sales, blockbusters $3.7 trillion and non-blockbusters $3.0 trillion, together about 70% of revenue. The super-blockbuster share of reported product sales rose from 7% in 2000 to 25% in 2020 and 42% in 2023, on par with the $1–5 billion blockbuster tier (Figure 1), COVID-19 products added to the 2021–2022 peak, but the rise began already pre-pandemic.

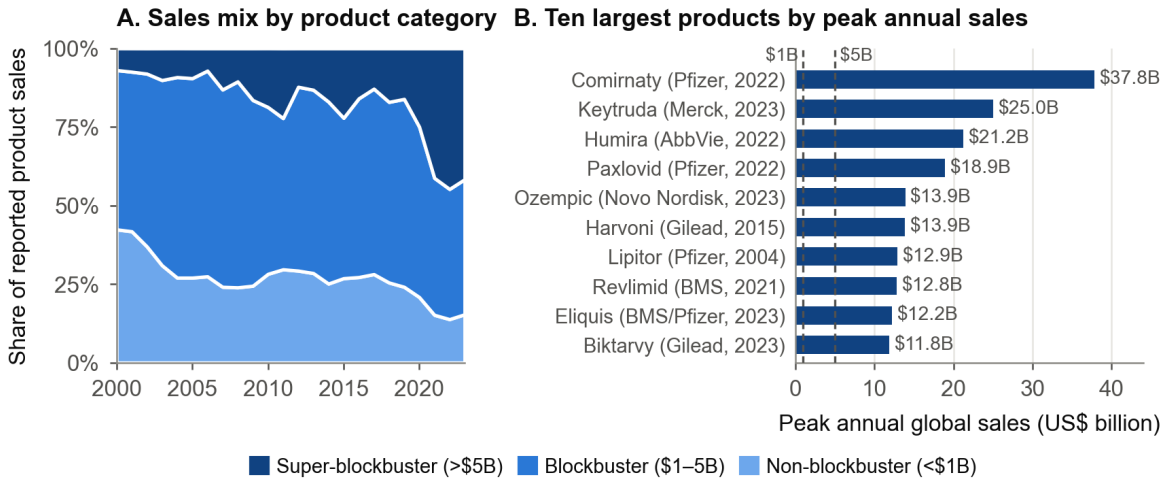


Figure 1. (A) Share of reported product sales by category, 20 firms, 2000–2023; each product-year is classified by its annual global sales. (B) Peak annual global sales of the ten largest products; dashed lines mark the $1 billion and $5 billion thresholds. Source: company annual reports; authors' calculations.

Revenues from the two highest categories move with payouts, but only the lower categories does so with R&D (Table 1). In the fixed-effects models, each additional dollar of super-blockbuster sales is associated with 17 cents of shareholder payouts and no detectable change in R&D. Blockbuster sales have a similar payout association and a weak R&D association ($p = 0.08$). Non-blockbuster sales are the only coefficient significantly associated with R&D, and they are unrelated to payouts. One-year-lagged models give a similar ranking, where lagged super-blockbuster sales predict payouts but not R&D, while lagged blockbuster and non-blockbuster sales predict R&D. Bootstrapped standard errors and two- and three-year lags confirm the pattern.

Table 1. Product-category sales, shareholder payouts and R&D expense, 20 firms, 2000–2023

	Dependent variable (scaled by total assets):			
	Payouts	R&D	Payouts	R&D
	Same-year sales		*One-year-lagged sales*	
	(1)	(2)	(3)	(4)
Super-blockbuster sales (>$5B)	0.172*** (0.092, 0.252)	0.021 (−0.061, 0.102)	0.217*** (0.140, 0.295)	−0.066 (−0.178, 0.046)
Blockbuster sales ($1–5B)	0.175*** (0.132, 0.218)	0.039* (−0.005, 0.083)	0.225*** (0.185, 0.265)	0.074** (0.016, 0.131)
Non-blockbuster sales (<$1B)	0.010 (−0.034, 0.054)	0.075*** (0.031, 0.120)	0.076*** (0.039, 0.113)	0.130*** (0.077, 0.183)
Firm fixed effects	Yes	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes
Observations	419	419	399	399
R^2	0.544	0.723	0.296	0.094
Adjusted R^2	0.489	0.689	0.249	0.033
Residual std. error (df = 373)	0.053	0.054	0.064	0.093
F statistic	9.906***	21.600***	6.275***	1.542**

Note: *p<0.1; **p<0.05; ***p<0.01

Payouts are dividends plus stock buybacks. 95% confidence intervals in parentheses. Constants not shown. Company fixed effects are omitted in the lagged models because of the lower ratio of observations to parameters.

Implications for the US medical innovation system

The results support the blockbuster model for the broad portfolio, where sales of non-blockbuster and, more to a lesser extent, blockbuster products move with R&D. They do not support it for the products that now dominate industry revenue: sales of super-blockbusters. They are the fastest-growing part of the portfolios and are associated with distributions to shareholders rather than reinvestment in research. The estimates suggest that the $1 billion “blockbuster” threshold no longer describes the products that drive industry finances, and that claims linking the prices of top-selling drugs to future innovation should be tested at the product level. For drug pricing policies, they imply that measures limiting revenue from the highest-selling products may reduce shareholder distributions more than R&D investment, delivering important insights for potential future discussions on drug price negotiations.

Keywords: blockbuster drugs; pharmaceutical R&D; shareholder payouts; stock buybacks; drug pricing; innovation spending.