Talking Points Based on Review of 2022 SEC 10K filings

In what follows we present a set of observations based on the review of 25 SEC 10-K filings that cover 2022 and some early months of 2023. The reports highlight several points regarding how the industry is responding to the enactment of the Inflation Reduction Act (IRA). Perhaps the most important observation is that industry pronouncements made in SEC filings differ considerably from those in company press commentaries, news reports and statements to Congress. For example, in contrast to what has appeared in the press, only one of the 25 firms noted the potential consequences of the 9 versus 13-year eligibility criteria for small molecule versus biological products. This suggests it may not be a priority issue for investors. Overall, all reports acknowledge that there is a great deal of uncertainty about how the IRA's prescription drug provisions will affect markets. Almost all reports report a truism that the IRA and other policy measures and environment changes may affect the revenues and economic circumstances of research based pharmaceutical companies. A second observation is that all these firms are continuing to make significant investments in early-stage drug development. Several increased spending in 2022 by notable amounts and some predict continued expansion through 2023. Only one company singled out the IRA as a cause for altering R&D plans. Finally, some companies noted the differential effects of the benefit redesign, the inflation rebate and the negotiation provisions would have on the financial circumstances facing specific drug products. Together the review suggests responses to the IRA that are consistent with notable uncertainty the around the consensus projection made by CBO and others of modest impacts of the IRA on overall revenues and R&D.

- Recently 25 publicly traded pharmaceutical firms filed SEC 10-K forms that summarize recent investment activities, changes in product development and projections about R&D activities and impacts of environmental and policy changes. Those firms account for over $82 billion in R&D spending in 2022.
- Most of the firms reviewed reported increased R&D spending in 2022 along substantial numbers of early-stage R&D projects. For example, J&J reported an 11.8% increase in R&D spending in 2022, Merck reported an 11% increase in R&D spending, Moderna reported a 65% increase in R&D spending and projected further increases in 2023.
    - Companies reports a variety of early-stage projects aimed at specific clinical areas. Prominent among them are oncology, diabetes, inflammatory diseases, neurological conditions, and autoimmune diseases. The new products represent a mix of biological and small molecule products. Pfizer has 34 projects in Phase I human trials and submitted 16 registration applications for product development. Moderna has 45 development candidates underway. Lilly has 45 drugs in development. Viatris offered a forward-looking statement that was representative of several firm efforts.
        - "we expect to expand our current scope of development into more innovative products, including NCEs and global 505(b)(2) products with a particular focus on three therapeutic areas: ophthalmology, gastrointestinal and dermatology..."
- Historically, pharmaceutical firms have averaged R&D project abandonment rates of 20% to 30%. The 10-Ks reported during the first part of 2023 reflect a far lower rate than the historical

average. Nine projects were clearly identified in the 10-K filings for the 25 companies. Biogen terminated 6 projects in 2022. The projects abandoned included treatments for neurological (ALS and MS) and psychiatric illnesses. Reductions in development of psychiatric drugs reflect a long-term trend that has been in place for at least a decade.

  - Only one firm attributed termination of a development project to the IRA. That was for a Phase 3 of a study of vutrisiran for Stargardt Disease was not initiated due to IRA. It is unclear whether the delay is permanent or temporary. It is also notable that the drug has a competitor (Patisiran) and was anticipated to sell at a price of $251,000. The drug has not been approved in the EU either.
  - There was virtually no mention about IRA impact on R&D even when potential pricing effects of the IRA were noted.

- Most firms note the enactment of the of the IRA. The Moderna statement on the IRA reflects a common theme across the companies.
  - "The IRA includes several provisions that will impact our business to varying degrees, including provisions that create a $2,000 out-of-pocket cap for Medicare Part D beneficiaries, impose new manufacturer financial liability on all drugs in Medicare Part D, allow the U.S. government to negotiate Medicare Part B and Part D pricing for certain high-cost drugs and biologics without generic or biosimilar competition, require companies to pay rebates to Medicare for drug prices that increase faster than inflation and delay the rebate rule that would require pass through of pharmacy benefit manager rebates to beneficiaries. The effect of IRA on our business and the healthcare industry in general is not yet known."
  - Several firms identified the tax provisions of the IRA that make stock buy back less financially attractive as potentially resulting in altered behavior with respect to such buy backs.
  - Several firms noted that the IRA is one among numerous changes in the health care environment that affects the pharmaceutical industry. The observation by AbbVie reflects that view. "The Inflation Reduction Act is to be implemented through forthcoming agency action, the outcome of which cannot be reasonably determined with certainty... AbbVie continues to evaluate the impact that the Inflation Reduction Act may have on the company. The potential for continuing changes to the health care system in the United States and the increased purchasing power of entities that negotiate on behalf of Medicare, Medicaid and private sector beneficiaries may result in additional pricing pressures."
- One line of thinking among industry observers is that drug companies will need to find new and innovative ways to reduce the costs of their research and development processes to remain competitive. This could lead to new technologies and strategies that may significantly reduce costs and increase the efficiency of research and development processes. It could also lead to increased collaborations between pharmaceutical companies, universities, and other research institutions to share resources and knowledge to develop more effective treatments for diseases.
  - Examples of joint R&D ventures include:

• Pfizer and Eli Lilly forming a joint venture to develop treatments for Alzheimer's disease
• Merck and Sanofi Aventis joining forces to develop treatments for diabetes
• GlaxoSmithKline and Novartis partnering to develop treatments for respiratory diseases
• Johnson & Johnson and Bristol-Myers Squibb creating a joint venture to develop treatments for cancer
• AstraZeneca and AbbVie forming a joint venture to develop treatments for autoimmune diseases

- Examples of new partnerships and collaborations in pharmaceutical R&D include:
  • Pfizer and the University of California San Francisco (UCSF) partnering to develop new treatments for neurological diseases
  • Merck and the University of California San Diego (UCSD) collaborating to develop new treatments for cancer
  • Novartis and the University of Oxford teaming up to develop new treatments for diabetes
  • Johnson & Johnson and Harvard University partnering to develop new treatments for rare diseases
  • GlaxoSmithKline and the University of Cambridge collaborating to develop new treatments for cardiovascular diseases