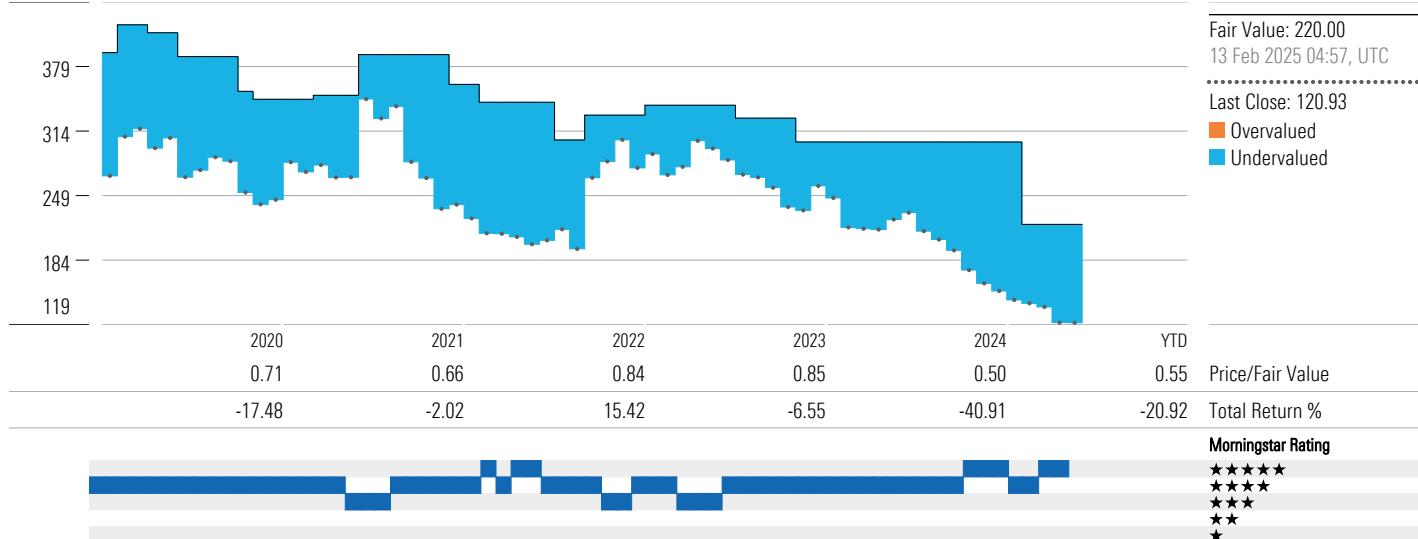


Biogen Inc BIIB ★★★★☆ 1 May 2025 21:26, UTC

Last Price 120.93 USD 1 May 2025	Fair Value Estimate 220.00 USD 13 Feb 2025 04:57, UTC	Price/FVE 0.55	Market Cap 17.99 USD Bil 2 May 2025	Economic Moat™ Narrow	Equity Style Box Mid Value	Uncertainty High	Capital Allocation Standard	ESG Risk Rating Assessment¹ 2 Apr 2025 05:00, UTC
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Price vs. Fair Value



Total Return % as of 01 May 2025. Last Close as of 01 May 2025. Fair Value as of 13 Feb 2025 04:57, UTC.

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The primary analyst covering this company does not own its stock.

The ESG Risk Rating Assessment is a representation of Sustainalytics' ESG Risk Rating.

Biogen Earnings: Leqembi Sales Steadily Climbing; Business Outlook Reiterated

Analyst Note Jay Lee, Senior Equity Analyst, 2 May 2025

Biogen reported 6% year-over-year growth which was aided by the timing of Spinraza (rare disease) shipments. In-market sales of Leqembi (Alzheimer's disease) were \$96 million. The company lowered 2025 guidance due to an upfront payment to Stoke, but its underlying business outlook is unchanged.

Why it matters: Leqembi's sales ramp over the next few years is crucial for Biogen, as its multiple sclerosis franchise declines. Although its sales ramp is a source of significant uncertainty, we think this quarter's sales are encouraging and support its potential for multibillion-dollar peak annual sales.

- We expect Leqembi's global sales momentum to be buoyed by its approval in the European Union in April. It has now passed regulatory review in all major developed markets around the world, which may incrementally improve physicians' perception of the drug.
- Approvals of the subcutaneous formulation for initiation (potentially in 2026) and maintenance (potentially August 2025) may also contribute to this drug's sales ramp by removing the need to reserve infusion beds, which is an administrative burden for some prescribing neurologists.

The bottom line: We maintain our fair value of \$220 per share for narrow-moat Biogen. We view the current market price as undervalued in light of the considerable uncertainty for Leqembi's sales ramp.

- Management said its 2025 financial outlook will not be affected if anticipated pharmaceutical tariffs are implemented by the US. However, part of this is due to high inventory levels. Also, its outlook

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Sector	Industry
 Healthcare	Drug Manufacturers - General

Business Description

Biogen and Idec merged in 2003, combining forces to market Biogen's multiple sclerosis drug Avonex and Idec's cancer drug Rituxan. Today, Rituxan and next-generation antibody Gazyna (oncology) and Ocrevus (multiple sclerosis) are marketed via a collaboration with Roche. Biogen markets several multiple sclerosis drugs including Plegidry, Tysabri, Tecfidera, and Vumerity. Biogen's newer products include Spinraza (SMA, with partner Ionis), Leqembi (Alzheimers, with partner Eisai), Skyclarys (Friedreich's Ataxia, Reata), Zurzuva (postpartum depression, Sage), and Qalsody (ALS, Ionis). Biogen has several drug candidates in phase 3 trials in neurology, immunology, and rare diseases.

does not consider the potential for retaliatory tariffs at this time.

- We would expect management to provide more clarity on the effect of tariffs as the policies become clearer.

Business Strategy & Outlook

Jay Lee, Senior Equity Analyst, 13 Feb 2025

We think Biogen's neurology, immunology, and focus on rare diseases support a narrow moat. Biogen's strategy has its roots in the 2003 merger of Biogen (Avonex for treating multiple sclerosis, or MS) and Idec (classic blood cancer drug Rituxan). The firm expanded its neurology portfolio beyond MS, including the blockbuster Spinraza for spinal muscular atrophy, or SMA, a rare neuromuscular disease. We see Biogen as a firm in transition, as MS revenue fades and new drugs for Alzheimer's, depression, and rare diseases begin to ramp up.

Biogen generated nearly \$6 billion in MS revenue in 2023, although we see these sales declining nearly 10% annually as the firm faces branded competition, generic pressure on Tecfidera, and biosimilar Tysabri launches. While pricing power and demand for Biogen's injectable MS portfolio are eroding in the face of new competition, Biogen receives substantial royalties on Roche's popular drug Ocrevus, which helps offset pressure on older MS drugs.

Outside of MS, we think Biogen's growth potential looks solid, although Alzheimer's market evolution is highly uncertain. We think sales of Spinraza (partnered with Ionis) will remain around \$2 billion, although competition from Novartis (gene therapy Zolgensma) and Roche (oral drug Evrysdi) has cut into growth. Biogen and Eisai's Leqembi received US Food and Drug Administration approval in January 2023, with full approval and Medicare reimbursement in July 2023, and we expect peak sales around \$3 billion. That said, the launch has been off to a slow start as diagnosis and treatment pathways become more standardized. New drugs like postpartum depression drug Zurzuva and Friedreich's Ataxia drug Skyclarys further support Biogen's portfolio. We also think the market underestimates Biogen's pipeline, which includes a continuing partnership with Ionis (including tau-targeting Alzheimer's drug BIIB080) and drug candidates to treat conditions including Parkinson's disease and lupus.

Bulls Say

Jay Lee, Senior Equity Analyst, 13 Feb 2025

- Biogen is a significant player in the \$20 billion global MS market with Avonex, Plegidry, Tysabri, and Tecfidera. The launch of Vumerity partly protects Tecfidera sales from generic headwinds in the US.
- Biogen receives royalties and profit share from Roche on MS drug Ocrevus and multiple CD20-targeted cancer therapies, boosting profitability.
- Biogen's neurology portfolio outside of MS, including Leqembi in Alzheimer's, should help diversify revenue and boost sales growth.

Bears Say

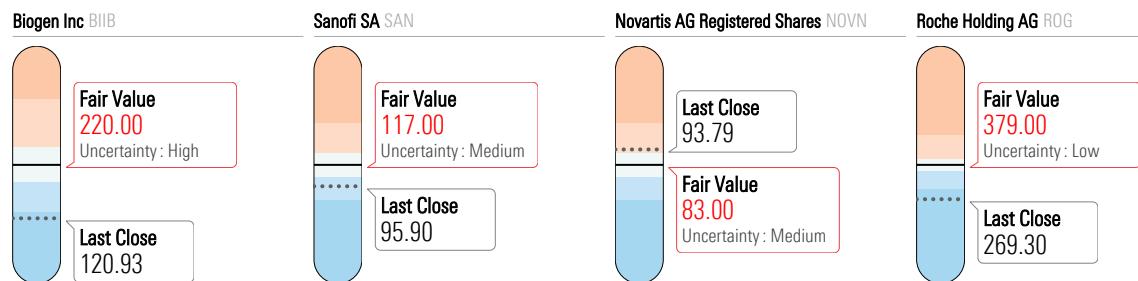
Jay Lee, Senior Equity Analyst, 13 Feb 2025

- Biogen's MS portfolio is under pressure from newer branded drugs as well as generic and biosimilar

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Competitors



Economic Moat	Narrow	Wide	Wide	Wide
Currency	USD	EUR	CHF	CHF
Fair Value	220.00 13 Feb 2025 04:57, UTC	117.00 25 Oct 2024 22:50, UTC	83.00 29 Apr 2025 22:19, UTC	379.00 1 Feb 2024 23:20, UTC
1-Star Price	341.00	157.95	112.05	473.75
5-Star Price	132.00	81.90	58.10	303.20
Assessment	Undervalued 1 May 2025	Undervalued 1 May 2025	Overvalued 1 May 2025	Undervalued 1 May 2025
Morningstar Rating	★★★★★ 1 May 2025 21:26, UTC	★★★★★ 1 May 2025 23:05, UTC	★★★ 1 May 2025 17:16, UTC	★★★★★ 1 May 2025 17:16, UTC
Analyst	Jay Lee, Senior Equity Analyst	Jay Lee, Senior Equity Analyst	Jay Lee, Senior Equity Analyst	Karen Andersen, Director
Capital Allocation	Standard	Standard	Standard	Exemplary
Price/Fair Value	0.55	0.82	1.13	0.71
Price/Sales	1.80	2.66	4.01	3.46
Price/Book	1.04	1.58	5.44	6.74
Price/Earning	9.80	12.99	17.64	14.32
Dividend Yield	0.00%	3.92%	3.73%	3.60%
Market Cap	17.72 Bil	117.11 Bil	185.24 Bil	214.20 Bil
52-Week Range	110.04—238.00	85.94—110.88	81.10—102.72	212.90—313.80
Investment Style	Mid Value	Large Blend	Large Blend	Large Blend

versions of its older therapies.

- Biogen's phase 3 Alzheimer's program for aducanumab was halted in March 2019 and produced mixed data. While the drug was approved in the US in June 2021, it has been a commercial failure.
- Spinraza's annual sales quickly grew to \$2 billion, but oral competition (Roche/PTC) and gene therapy (Novartis) threaten growth.

Economic Moat Jay Lee, Senior Equity Analyst, 13 Feb 2025

Biogen has achieved strong profitability based on its diversified multiple sclerosis, or MS, portfolio and a long-standing Roche collaboration for CD20-based drugs in MS and oncology. However, we think the firm's wide moat has eroded into a narrow one as branded and generic drugs are pressuring MS sales and as the launch of new Alzheimer's disease drug Leqembi is slow to gain traction. Biogen's emerging portfolio does appear to have intangible assets covering markets outside of MS across a range of

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indications in immunology, neurology, and rare diseases. Returns on invested capital, historically north of 20%, are likely to bottom out over the next couple of years due to generic pressure on Tecfidera and biosimilar pressure on Rituxan and Tysabri. However, we expect ROICs to exceed our 7.1% cost of capital estimate once again by 2026 and to rebound to the midteens in the long run.

We think the firm faces environmental, social, and governance risks, particularly related to potential US drug price-related policy reform (Biogen sees roughly 60% of its sales from the US market) and ongoing potential for product governance issues (including litigation). While we have factored these threats into our analysis, we don't see them as material to our valuation or moat rating.

Biogen's profit share with Roche is poised to see growth again after significant Rituxan biosimilar headwinds in 2021-23. Rituxan remains the standard of care in several forms of hematological cancer, but Gazyva's superior data in leukemia and certain forms of lymphoma, as well as potential in lupus, should help counter this threat to the profit share. In addition, Biogen receives substantial (more than 20%) royalties on Roche's MS therapy Ocrevus in the US, and we now model peak sales of roughly \$9 billion (\$6.5 billion in the US) for this dominant therapy. Also, Biogen will receive a portion of profits on Roche's CD20-targeting bispecifics Lunsumio and Columvi, which were approved as blood cancer treatments in 2022-23.

In Biogen's MS portfolio, we expect sales to decline due to both branded and generic competition. Avonex is the leading interferon therapy in MS because of its long-term safety record and relatively convenient once-weekly injections, and Plegridy improves convenience to twice-monthly injections, but these products are less effective than newer options like Ocrevus. Biogen's Tysabri continues to achieve blockbuster sales based on outstanding efficacy despite rare, but serious side effects, although biosimilars are now eroding sales. Oral MS drug Tecfidera had a strong launch and continues to show solid safety and efficacy data; US generic launches began in 2020 and are expected in Europe in 2025. The ability of Biogen's newer oral drug Vumerity to improve GI tolerability should partly offset headwinds from competition, but we still assume declines for Biogen's total MS drug sales. Biogen does not have next-generation multiple sclerosis drugs to directly replace the several drugs going off patent that have supported its moat over the past two decades. MS sales declines put pressure on the remainder of the firm's portfolio and pipeline to support growth.

Spinal muscular atrophy drug Spinraza (partnered with Ionis) is not likely to be a growth driver, but we don't see it as a drag on growth either. The treatment saw sales peak in 2019 at around \$2 billion, with more recent pressure as Spinraza shares the market with Novartis' gene therapy Zolgensma and Roche's oral therapy Evrysdi. We expect sales of Spinraza to grow slowly over the next few years as competition counters some of the drug's expansion into more international markets.

In Alzheimer's disease, we see significant uncertainty around the launch of Biogen and Eisai's Leqembi,

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which has had Medicare reimbursement in place since mid-2023, but is still generating minimal sales. Biogen has sunk substantial amounts of money into research and development, manufacturing, and commercialization preparation in Alzheimer's disease, only to see one failed launch with Aduhelm and a very slow launch of newer drug Leqembi. If the pathway to Alzheimer's diagnosis and treatment does not begin to improve rapidly, Biogen's high-risk investment in Alzheimer's disease may not pay off. We assume Leqembi sales will reach \$3 billion globally (shared with Eisai), but we think the sales ramp hinges on approval of its subcutaneous dosing options, better diagnostics, and more convenient maintenance dosing.

Cost-cutting programs and a focus on acquiring lower-risk programs in immunology and rare diseases are diversifying our revenue forecast, so success with these programs could move the firm back to a wide moat rating, regardless of Alzheimer's disease sales. The launch of Friedreich's ataxia drug Skyclarys (gained in the Reata acquisition in 2023) has been strong, and we expect peak sales well north of \$1 billion. Zurzuvae (part of the Sage collaboration) is also launching and seeing solid demand in postpartum depression. Biogen has an Ionis-partnered pipeline to follow Spinraza in areas including Parkinson's (phase 1 LRRK2) and Alzheimer's (antisense tau drug BIIB080). 2020 collaborations with Denali in neurodegenerative diseases and with Sage in depression and movement disorders also expand the firm's pipeline and bring more potential launches to the portfolio to diversify away from exposure to any single pipeline failure.

Fair Value and Profit Drivers Jay Lee, Senior Equity Analyst, 13 Feb 2025

We are lowering our fair value estimate to \$220 per share from \$303 due to lower forecasts for sales of key drugs, especially for Alzheimer's drug Leqembi.

We now assume \$3 billion in global peak sales of Biogen and Eisai's Leqembi. We think there is a wide range of outcomes for its peak revenue and still think it has promise, but due to its slow sales ramp and the potential for competing drugs to eventually enter this space, we adopt a more cautious view.

We expect sales of Reata's newly approved drug Skyclarys will eventually exceed \$1 billion, although this depends on market penetration and whether competition enters the market (as early as 2026).

We think combined global sales of Avonex and Plegridy will continue to fall, with low-double-digit declines annually because of new competition. We expect Tysabri declines to accelerate following the launch of a Sandoz biosimilar. Our assumption on Ocrevus royalties are based on peak sales of \$9 billion.

For Spinraza (nusinersen), sales began to decline in 2020 as new patients and treated Spinraza patients opted for either competing gene therapy (Novartis' Zolgensma) or small-molecule therapy (Roche/PTC's Evrysdi), and fewer patients initiated therapy (the first year of therapy is twice as expensive). We now

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expect sales to stabilize at around \$1.5 billion.

Regarding the US Inflation Reduction Act, we have assumed a 1% US sales step-down in 2025 due to Medicare Part D redesign, as well as slightly lower Gazyva profit share from Roche due to potential Medicare negotiations beginning in 2028, although none of these had a significant enough impact to change our valuation.

We assume a weighted average cost of capital of 7.1%.

Risk and Uncertainty Jay Lee, Senior Equity Analyst, 13 Feb 2025

Biogen's profitability depends heavily on its MS franchise, Spinraza, and the ramp-up of recently approved drugs such as Skyclarys and Leqembi. While demand is relatively inelastic for Biogen's portfolio of MS treatments, the commercial failure of Alzheimer's drug Aduhelm demonstrates the high-risk nature of some of Biogen's pipeline targets, and we therefore assign a High Morningstar Uncertainty Rating.

This rating is not materially affected by environmental, social, and governance risks, although we see access to basic services (tied to drug pricing) as the biggest ESG risk that Biogen needs to manage. Biogen sees 60% of its sales from the US, increasing its exposure to US policy changes. We include a 1% step-down in 2025 for Medicare Part D redesign. We assume a more than 50% probability of Biogen seeing future costs related to product governance ESG risks (such as off-label marketing or litigation related to side effects), and therefore model annual legal costs at 1% of non-GAAP net income, which has an immaterial effect on our base valuation.

Biogen is still vulnerable to biosimilar Rituxan, which launched in 2020 in the US, as revenue from the Roche collaboration feeds directly to the bottom line and boosts margins. Newer injectables like Novartis' Kesimpta are likely to weigh on sales of older injectable MS therapies like Avonex and Plegridy, and Tecfidera sales are plummeting due to US generics. Biogen's MS portfolio has enjoyed tremendous pricing power in the United States, and insurers could begin to find ways to put pressure on future price increases as more competitors reach the market.

Capital Allocation Jay Lee, Senior Equity Analyst, 23 Oct 2024

We assign Biogen a Standard Morningstar Capital Allocation Rating. The rating reflects our belief that Biogen possesses a sound balance sheet, fair investment outlook, and mixed shareholder distributions. Biogen's \$5.9 billion in net debt (as of the end of 2023) reflects the firm's history of strong cash flows from its MS business as well as profit share from Roche in oncology and MS, balanced by heavy share repurchases and more recent activity in business development (including the \$7.3 billion acquisition of Reata in 2023). Biogen's net debt/EBITDA ratio should return to below 2 in 2024 and improve over the next few years. Despite declines from generic Tecfidera and biosimilar Tysabri, Ocrevus royalties remain

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strong, and several launches offer growth potential.

We think Biogen's history of investments supports a fair rating, as the firm's acquisitions and collaborative deals look relatively neutral to the firm's ROICs, meaning that they don't appear to create or destroy significant economic value. A wild card in this analysis is Aduhelm, which was first licensed from Neurimmune in 2007. While the drug was a commercial failure, it enabled Biogen to form a 2014 collaboration with Eisai that included the firm's Alzheimer's drug Leqembi, which reported positive key phase 3 data in September 2022 and received FDA approval in January 2023. Leqembi's launch has been slow, but we still think that the market for such therapies is north of \$10 billion annually by 2030. Biogen has also built a significant relationship with RNA-based therapy firm Ionis, led by current blockbuster Spinraza but also encompassing neurodegenerative diseases like Alzheimer's and Parkinson's. Deals with Denali (Parkinson's) and Sage (depression) were formed in 2020 and will also drive our view of Biogen's investment strategy as clinical data reads out. That said, the 2019 acquisition of Nightstar has proved disappointing, given the recent failure of two ophthalmology gene therapy products in clinical trials. We also think the 2023 acquisition of Reata could be slightly overpriced, although we think that the firm's Friedreich ataxia drug is a great fit for Biogen strategically.

While Biogen does not pay a dividend, we think shareholder distributions in the form of share buybacks could be slightly excessive, and we have a mixed view on the company's distribution strategy. The firm has prioritized buybacks over the past few years, returning on average more than \$5 billion annually during 2018-20. These buybacks occurred at a time of significant uncertainty for Biogen's cash flows from MS drug Tecfidera (now seeing generic competition in the US) and the Alzheimer's pipeline (see Aduhelm's clinical and regulatory roller coaster); further acquisitions or collaborative deals could have been a better use of cash, in our opinion. However, Biogen has still had adequate cash to support a ramp in manufacturing capacity for Alzheimer's disease antibodies and the formation of several collaborations. In addition, our positive view on Biogen's overall strategy and competitive positioning in neurology supports a narrow moat, and shares have appeared undervalued over much of the past three years, so we don't think Biogen has been destroying significant value via share buybacks.

Analyst Notes Archive

Biogen Earnings: Guidance Slightly Disappointing, Fair Value Lowered on Reassessment of Leqembi

Jay Lee, Senior Equity Analyst, 13 Feb 2025

Narrow-moat Biogen reported results that were in line with our expectations. Revenue guidance for 2025 is a mid-single-digit decline at constant currency, which we find slightly disappointing. We are lowering our fair value estimate to \$220 per share from \$303 due to lower forecasts for key drugs, especially Alzheimer's drug Leqembi. There is a wide range of outcomes for its peak revenue. Still, due to its slow sales ramp and the potential for competing drugs to eventually enter this space, we adopt a more cautious view and lower our peak revenue forecast to \$3 billion from \$6 billion. Revenue in the

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quarter was \$2.5 billion, or 3% year-on-year growth on a reported basis, which brings full-year revenue to \$9.7 billion, or a 2% year-on-year decline. Quarterly sales of the multiple sclerosis franchise, including Tysabri and Tecfidera, experienced an 8% year-on-year decline. However, this was offset by continued growth in newly launched products, including Skyclarys (rare disease), Leqembi, and Zurzuvae (postpartum depression). Spinraza (rare disease) grew by 2%. We continue to think that Biogen's story depends on the ramp-up of Leqembi sales. In the long run, Leqembi can potentially expand its market to presymptomatic Alzheimer's patients by demonstrating efficacy in the AHEAD 3-45 study, which is expected to read out in 2028. Success here could substantially improve its market potential, but in this timeframe, there is a risk that other early-stage candidate drugs could demonstrate data that is competitive with Leqembi. This includes not only other amyloid-targeting candidates but also GLP-1 and tau-targeting drugs.

More Trump Healthcare Nominations Largely Aligned With Kennedy

Karen Andersen, CFA, Director, 2 Dec 2024

Following President-elect Donald Trump's Nov. 14 announcement of the nomination of Robert F. Kennedy Jr. as secretary of the US Department of Health and Human Services, there have been several more nominations for leadership in the 13 HHS divisions, including Dr. Mehmet Oz (Centers for Medicare and Medicaid Services) on Nov. 19, Dr. Marty Makary (US Food and Drug Administration) and Dr. Dave Weldon (Centers for Disease Control and Prevention) on Nov. 22, and Dr. Jay Bhattacharya (National Institutes of Health) on Nov. 26. Overall, we think these selections show a consistent theme of introducing potential disruptive forces to US healthcare, although their lack of experience and the power of career staffers in these agencies could serve to blunt any significant proposed changes. We continue to see obesity drugs and vaccines as areas of potential scrutiny, although without any clarity on proposals, we're not making any changes to our fair value estimates following these announcements. As discussed in our Nov. 18 note, we think biopharma industry tailwinds under the new Trump administration could include repealing the Medicare negotiation provision in the Inflation Reduction Act, less Federal Trade Commission scrutiny of acquisitions, as well as continued lower corporate taxes. However, Kennedy's skepticism of vaccine and obesity drug benefits could erode public trust and we think his team could slow the approval of new drugs and vaccines and de-emphasize CDC vaccine guidelines. Views on obesity drugs will likely be front and center in 2025, given the proposed rule from the Biden administration to expand obesity drug coverage in Medicare and Medicaid and the upcoming announcement of the 2027 list of negotiated drugs (which is likely to include Novo Nordisk's semaglutide). The Trump administration would need to finalize the rule and we expect Kennedy will be conflicted over whether to discourage reliance on weight loss drugs or reduce obesity drug costs significantly.

Trump's Nomination of RFK Jr. to Lead HHS a Potential Industry Headwind

Karen Andersen,

Biogen Inc BIIB ★★★★★ 1 May 2025 21:26, UTC

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CFA, Director, 18 Nov 2024

President-elect Donald Trump announced on Nov. 14 that he is nominating Robert F. Kennedy Jr. to be secretary of the Department of Health and Human Services under his new administration in 2025. RFK Jr. has strong views on public health and, if confirmed, could use his position to make changes at several of the 13 HHS divisions. In our Nov. 8 note, we discussed the potential tailwinds of a Trump administration, including possible repeal of the Medicare negotiation provision in the Inflation Reduction Act, less Federal Trade Commission scrutiny of acquisitions, and a likely continuation of lower corporate taxes. However, if RFK's nomination is confirmed, we expect more "wild card" headwinds to the industry will come to fruition. As the HHS covers the US Food and Drug Administration and the Centers for Disease Control and Prevention, an HHS secretary skeptical of vaccine and obesity drug benefits could work to erode public trust, put up roadblocks for approval of new vaccines, and prevent the CDC from recommending any vaccines that make it through the approval process. With less federal guidance, we think it is possible certain states could waver in support of broad mandates for childhood vaccines. All of these could weigh on sales of vaccines in the US, including covid vaccine makers Moderna and BioNTech and big biopharma vaccine makers like GSK (we model 14% of GSK revenue from US vaccine sales in 2024), Pfizer (12%), Merck (9%), and Sanofi (6%). If RFK Jr. is confirmed, we may lower our US vaccine sales estimates, although we don't think reductions would be long-lasting, and we don't yet see this as a significant hit to our valuations. Broad international price benchmarks could be a bear-case scenario under RFK Jr., which may increase our Morningstar Uncertainty Ratings. That said, any proposal would likely start with a smaller portion of the Medicare market and not extend to private markets, and we would be unlikely to include this in our fair value estimates.

Biopharma Election Impact: Potential Reduced IRA Headwind but Unpredictable Challenges Karen Andersen, CFA, Director, 8 Nov 2024

We think that President-elect Donald Trump brings a mix of potential headwinds and tailwinds to the biopharma industry, and we're not making any adjustments to our fair value estimates at this time. We had previously assumed that the most likely case was split control of the presidency and Congress by Democrats and Republicans. However, with Republicans locking in control of the Senate and holding a lead in elections in the House, we think it looks increasingly likely that Trump and his party could have control across both branches of government, making any potential policy priorities more likely to be implemented. In terms of industry tailwinds, Trump could lessen pressure from the Federal Trade Commission on mergers and acquisitions, making it easier for large firms with sufficient cash to expand their pipelines. He could also try to repeal the Medicare negotiation portion of the Inflation Reduction Act, lessening pricing pressure on the industry. However, Trump's alignment with and potential to place RFK Jr. in a prominent role in the Department of Health and Human Services or the Food and Drug Administration could lead to less predictable outcomes, ranging from White House influence in approval

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decisions (possibly fewer approvals of certain new types of drugs, and particularly vaccines) to high turnover of FDA staff (leading to significant backlogs in applications). One of the first priorities could be an attempt to repeal the IRA. We think it would be difficult to repeal the IRA in its entirety, as many parts of its multiyear implementation are already in progress, and legislators might be unwilling to stop funding on projects in their states and districts. However, a more piecemeal approach to dismantling some upcoming provisions might work.

Biogen Earnings: Full-Year Guidance Raised; Early Leqembi Sales Encouraging but Uncertainty

Remains Jay Lee, Senior Equity Analyst, 30 Oct 2024

Narrow-moat Biogen reported results that were in line with our expectations, which reflects encouraging improvement in operating profit margins. Additionally, the company slightly raised its full-year guidance for operating income to grow at a high-teen percentage from the last quarter's mid- to high-teen percentage. We maintain our fair value estimate of \$303 per share but note that Leqembi, a crucial piece of Biogen's story, is not yet derisked and remains a source of considerable uncertainty. Revenue in the quarter was \$2.5 billion, or a 3% year-on-year decline, and continues the trend of falling revenue in its older multiple sclerosis drugs being gradually replaced by revenue from its newer treatments for rare disease, Alzheimer's disease, and depression. Additionally, non-GAAP operating profit margins was 30.2% for the quarter; although this is only a 1.8 percentage point improvement over the same period last year, we are encouraged by the year-to-date progress, which has improved 7.1 percentage points when comparing the first three quarters of 2024 and 2023. This reflects a combination of ongoing improvement in product mix, less contribution from low-margin contract manufacturing, and cost control measures, and is in line with its current guidance. Although we expect the company's top line to return to growth in 2025, Biogen's story depends on the gradual ramp-up of Leqembi sales. Sales were \$67 million, or 68% sequential growth, which we think is quite encouraging. However, there are still many hurdles to clear before it can reach our peak revenue estimate of over \$6 billion. Events that can potentially drive further adoption include approval of its subcutaneous formulation for maintenance (potentially 2025) and induction (potentially 2026), refiling and approval in Europe with longer-term clinical and real-world data, and more widespread utilization of blood-based diagnostics.

Biogen Earnings: Shares Undervalued as Cost Controls Materialize and New Launches Accelerate

Karen Andersen, CFA, Director, 1 Aug 2024

We're maintaining our \$303 fair value estimate for Biogen following mixed results in the second quarter. Biogen's flat second-quarter revenue reflected a combination of generic and biosimilar headwinds on older multiple sclerosis drugs but also a strong launch of rare-disease drug Skyclaris, and cost controls helped secure 30% non-GAAP operating income growth (43% growth including the proceeds from the sale of a priority review voucher). We still think Biogen has a long road to recovery ahead of it.

Biogen Inc BIIB ★★★★☆ 1 May 2025 21:26, UTC

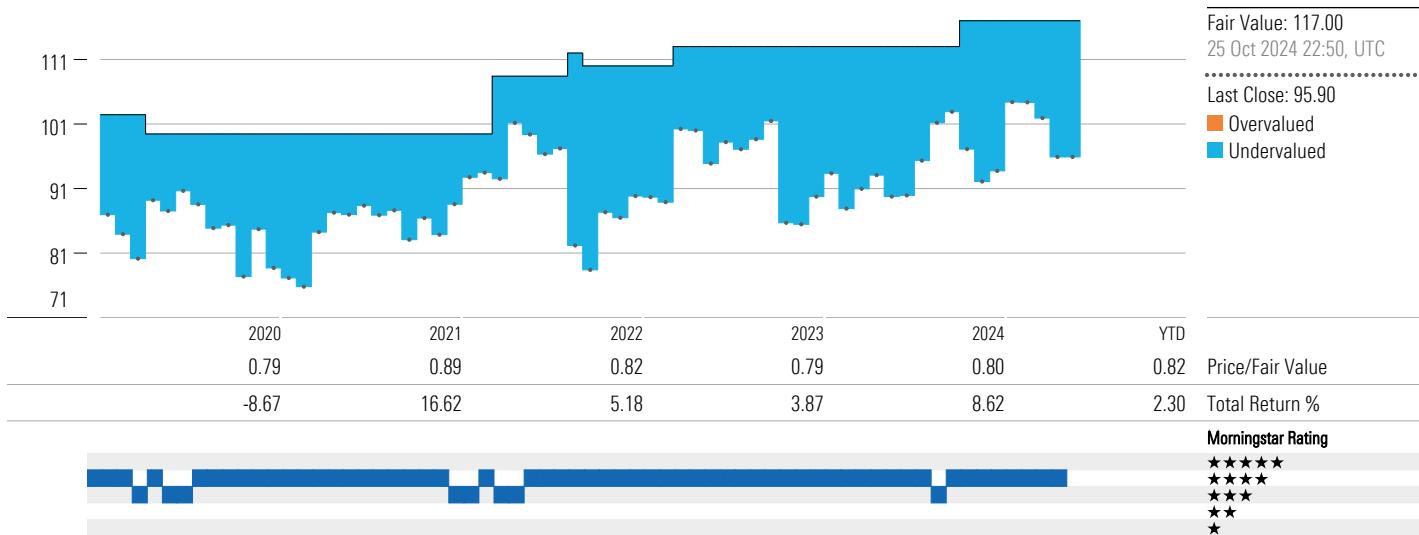
Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment ¹
120.93 USD 1 May 2025	220.00 USD 13 Feb 2025 04:57, UTC	0.55	17.99 USD Bil 2 May 2025	Narrow	Mid Value	High	Standard	2 Apr 2025 05:00, UTC

particularly given the slow launches of Alzheimer's drug Leqembi and postpartum depression drug Zurzuvae. Following the July close of the \$1.15 billion HI-Bio acquisition, Biogen's quarter-end cash balance of \$1.9 billion is even lower, and with \$6.3 billion in debt, we expect Biogen is only capable of tuck-in acquisitions going forward, particularly as management now expects to retain its biosimilar business. That said, we're encouraged by recent Leqembi sales and advancing pipeline programs in lupus and Alzheimer's as well as a strong recent track record with the acquisitions of Reata (Skyclarys) and HI-Bio (phase 3 kidney disease drug candidate felzartamab). We think Biogen's continuing innovation in neurology as well as expansion into rare diseases and immunology warrants a narrow moat rating. Positive data later this year from lupus drug candidate dapirolizumab or a high-dose version of SMA drug Spinraza would add upside to our valuation.

Biogen Inc BIIB ★★★★★ 1 May 2025 21:26, UTC

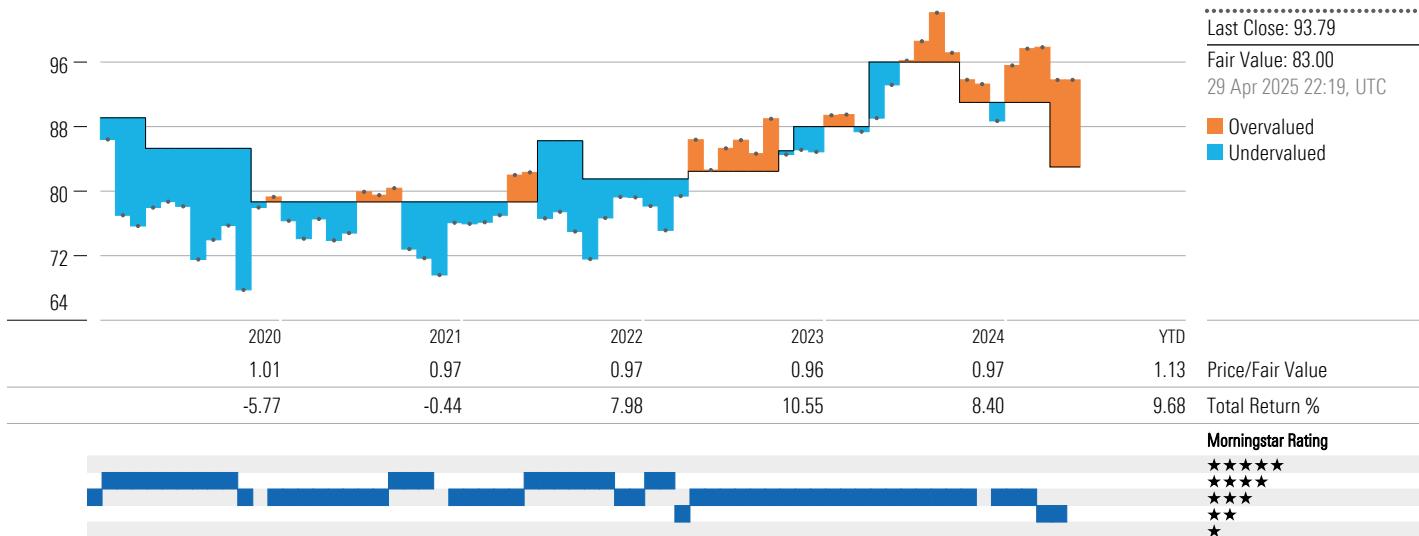
Competitors Price vs. Fair Value

Sanofi SA SAN



Total Return % as of 30 Apr 2025. Last Close as of 30 Apr 2025. Fair Value as of 25 Oct 2024 22:50, UTC.

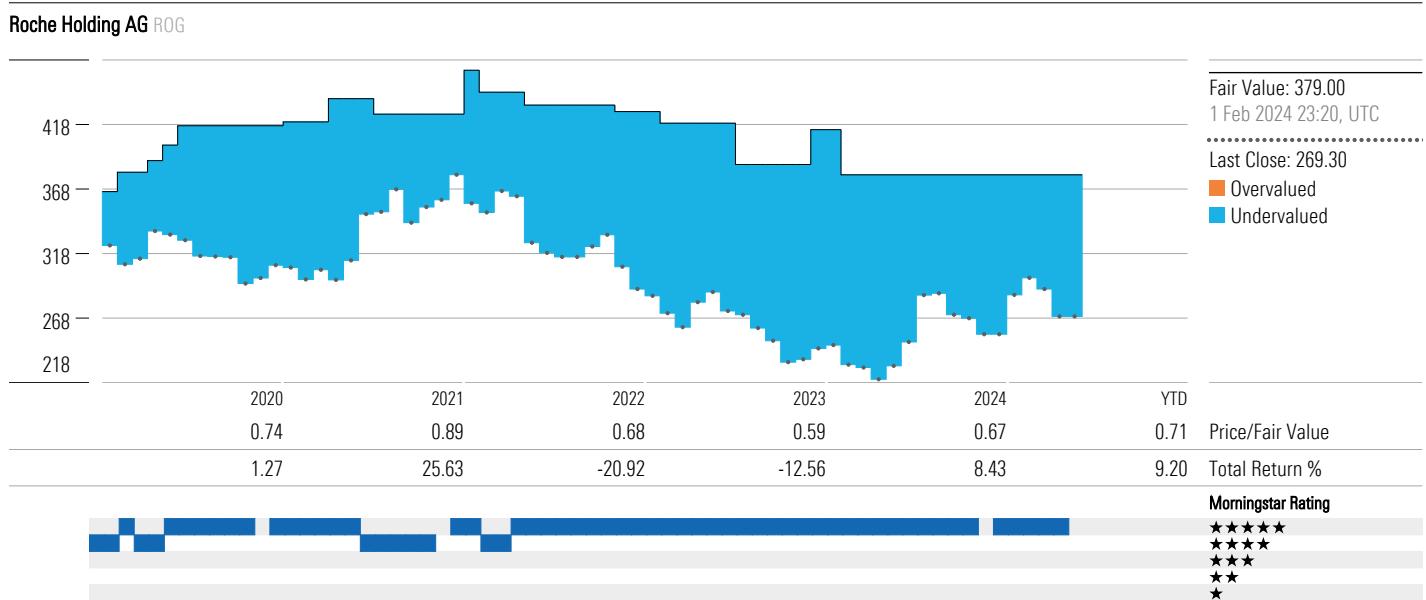
Novartis AG Registered Shares NOVN



Total Return % as of 01 May 2025. Last Close as of 01 May 2025. Fair Value as of 29 Apr 2025 22:19, UTC.

Biogen Inc BIIB ★★★★★ 1 May 2025 21:26, UTC

Competitors Price vs. Fair Value



Total Return % as of 01 May 2025. Last Close as of 01 May 2025. Fair Value as of 1 Feb 2024 23:20, UTC.

Biogen Inc BIIB ★★★★★ 1 May 2025 21:26, UTC

Last Price 120.93 USD 1 May 2025	Fair Value Estimate 220.00 USD 13 Feb 2025 04:57, UTC	Price/FVE 0.55	Market Cap 17.99 USD Bil 2 May 2025	Economic Moat™ Narrow	Equity Style Box 	Uncertainty High	Capital Allocation Standard	ESG Risk Rating Assessment¹ 2 Apr 2025 05:00, UTC
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Morningstar Valuation Model Summary

Financials as of 12 Feb 2025	Actual			Forecast					
	2021	2022	2023	2024	2025	2026	2027	2028	
Fiscal Year, ends 31 Dec									
Revenue (USD Mil)	10,982	10,173	9,836	9,676	9,161	9,307	9,909	10,217	
Operating Income (USD Mil)	2,815	2,895	2,050	2,473	2,278	2,364	2,589	2,728	
EBITDA (USD Mil)	3,328	4,002	2,107	3,035	2,708	2,718	2,874	2,958	
Adjusted EBITDA (USD Mil)	3,328	4,002	2,107	3,035	2,708	2,718	2,874	2,958	
Net Income (USD Mil)	1,556	3,047	1,161	1,632	1,382	1,349	1,526	1,538	
Adjusted Net Income (USD Mil)	2,878	2,580	2,144	2,404	1,994	1,964	2,150	2,167	
Free Cash Flow To The Firm (USD Mil)	4,767	2,570	-2,939	1,411	2,154	1,862	1,778	1,940	
Weighted Average Diluted Shares Outstanding (Mil)	150	146	146	144	142	139	137	135	
Earnings Per Share (Diluted) (USD)	10.40	20.87	7.97	11.32	9.76	9.68	11.11	11.37	
Adjusted Earnings Per Share (Diluted) (USD)	19.24	17.67	14.72	16.68	14.08	14.09	15.66	16.02	
Dividends Per Share (USD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Margins & Returns as of 12 Feb 2025	Actual			Forecast					
	3 Year Avg	2021	2022	2023	2024	2025	2026	2027	2028 5 Year Avg
Operating Margin %	25.5	25.6	28.4	20.8	25.6	24.9	25.4	26.1	26.7 21.7
EBITDA Margin %	—	30.3	39.3	21.4	31.4	29.6	29.2	29.0	29.0 —
Adjusted EBITDA Margin %	—	30.3	39.3	21.4	31.4	29.6	29.2	29.0	29.0 29.6
Net Margin %	18.7	14.2	30.0	11.8	16.9	15.1	14.5	15.4	15.0 18.5
Adjusted Net Margin %	24.5	26.2	25.4	21.8	24.8	21.8	21.1	21.7	21.2 22.1
Free Cash Flow To The Firm Margin %	12.9	43.4	25.3	-29.9	14.6	23.5	20.0	18.0	19.0 19.0
Growth & Ratios as of 12 Feb 2025	Actual			Forecast					
	3 Year CAGR	2021	2022	2023	2024	2025	2026	2027	2028 5 Year CAGR
Revenue Growth %	-9.9	-18.3	-7.4	-3.3	-1.6	-5.3	1.6	6.5	3.1 0.8
Operating Income Growth %	-24.1	-39.8	2.8	-29.2	20.7	-7.9	3.8	9.5	5.4 5.9
EBITDA Growth %	5.6	-33.5	20.2	-47.3	44.0	-10.8	0.4	5.7	2.9 1.6
Adjusted EBITDA Growth %	-25.1	-33.5	20.2	-47.3	44.0	-10.8	0.4	5.7	2.9 7.0
Earnings Per Share Growth %	-31.5	-58.1	100.6	-61.8	42.0	-13.8	-0.9	14.9	2.3 7.4
Adjusted Earnings Per Share Growth %	-31.5	-42.9	-8.2	-16.7	13.3	-15.6	0.0	11.1	2.4 7.4
Valuation as of 12 Feb 2025	Actual			Forecast					
	2021	2022	2023	2024	2025	2026	2027	2028	
Price/Earning	—	15.7	17.6	7.3	8.6	8.6	7.7	7.5	
Price/Sales	—	3.7	2.3	1.8	1.9	1.9	1.8	1.7	
Price/Book	—	3.0	2.5	1.1	1.1	1.0	1.0	0.9	
Price/Cash Flow	—	—	—	—	—	—	—	—	
EV/EBITDA	—	10.7	12.9	7.2	8.0	8.0	7.6	7.3	
EV/EBIT	—	14.8	13.3	8.8	9.5	9.2	8.4	8.0	
Dividend Yield %	—	—	—	—	—	—	—	—	
Dividend Payout %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Free Cash Flow Yield %	—	—	—	—	—	—	—	—	
Operating Performance / Profitability as of 12 Feb 2025	Actual			Forecast					
	2021	2022	2023	2024	2025	2026	2027	2028	
Fiscal Year, ends 31 Dec									
ROA %	12.4	4.3	6.2	5.1	5.2	5.5	5.4	5.6	
ROE %	22.8	7.9	10.5	8.6	8.1	8.8	8.6	9.4	
ROIC %	10.6	6.4	5.8	5.3	5.7	6.6	7.2	8.6	

Biogen Inc BIIB ★★★★★ 1 May 2025 21:26, UTC

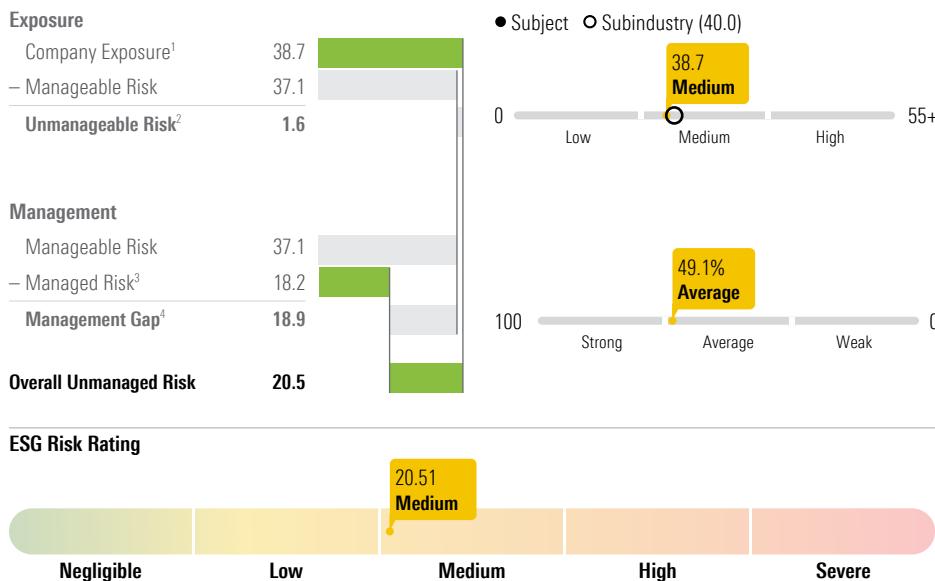
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Key Valuation Drivers as of 12 Feb 2025		Discounted Cash Flow Valuation as of 12 Feb 2025	
			USD Mil
Cost of Equity %	7.5		
Pre-Tax Cost of Debt %	5.8		13,323
Weighted Average Cost of Capital %	7.1		4,132
Long-Run Tax Rate %	18.0		18,319
Stage II EBI Growth Rate %	2.7		
Stage II Investment Rate %	40.0		
Perpetuity Year	15		
		Total Firm Value	35,774
		Cash and Equivalents	1,050
		Debt	7,338
		Other Adjustments	-477
		Equity Value	29,009
		Projected Diluted Shares	143
		Fair Value per Share (USD)	220.00

Biogen Inc BIIB ★★★★☆ 1 May 2025 21:26, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment¹
120.93 USD 1 May 2025	220.00 USD 13 Feb 2025 04:57, UTC	0.55	17.99 USD Bil 2 May 2025	Narrow	Mid Value	High	Standard	 2 Apr 2025 05:00, UTC

ESG Risk Rating Breakdown



- Exposure represents a company's vulnerability to ESG risks driven by their business model
- Exposure is assessed at the Subindustry level and then specified at the company level
- Scoring ranges from 0-55+ with categories of low, medium, and high-risk exposure
- Management measures a company's ability to manage ESG risks through its commitments and actions
- Management assesses a company's efficiency on ESG programs, practices, and policies
- Management score ranges from 0-100% showing how much manageable risk a company is managing

ESG Risk Rating



ESG Risk Ratings measure the degree to which a company's value is impacted by environmental, social, and governance risks, by evaluating the company's ability to manage the ESG risks it faces.

1. A company's Exposure to material ESG issues 2. Unmanageable Risk refers to risks that are inherent to a particular business model that cannot be managed by programs or initiatives 3. Managed Risk = Manageable Risk multiplied by a Management score of 49.1% 4. Management Gap assesses risks that are not managed, but are considered manageable 5. ESG Risk Rating Assessment = Overall Unmanaged Risk + Unmanageable Risk

ESG Risk Rating Assessment⁵



ESG Risk Rating is of Apr 02, 2025. Highest Controversy Level is as of Apr 08, 2025. Sustainalytics Subindustry: Biotechnology. Sustainalytics provides Morningstar with company ESG ratings and metrics on a monthly basis and as such, the ratings in Morningstar may not necessarily reflect current Sustainalytics' scores for the company. For the most up to date rating and more information, please visit: sustainalytics.com/esg-ratings/.

Peer Analysis 02 Apr 2025

Company Name	Exposure	Management	ESG Risk Rating
Biogen Inc	38.7 Medium	49.1 Average	20.5 Medium
Roche Holding AG	47.1 Medium	52.8 Strong	24.0 Medium
Sanofi SA	47.0 Medium	64.5 Strong	18.7 Low
Novartis AG	44.2 Medium	69.8 Strong	15.6 Low
Dyne Therapeutics Inc	43.3 Medium	16.9 Weak	36.3 High

Appendix

Historical Morningstar Rating

Biogen Inc BIIB 1 May 2025 21:26, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	—	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
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Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
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Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

Sanofi SA SAN 1 May 2025 23:05, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	—	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
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Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
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Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

Novartis AG Registered Shares NOVN 1 May 2025 17:16, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	—	★★★	★★★	★★★	★★★	★★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
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Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
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Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
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Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
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Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
—	★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

Roche Holding AG ROG 1 May 2025 17:16, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	—	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
—	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
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Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
—	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
—	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

Research Methodology for Valuing Companies

Overview

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our globally standardized, proprietary discounted cash flow, or DCF, modeling templates. We use scenario analysis, depth competitive advantage analysis, and a variety of other analytical tools to augment this process. Moreover, we think analyzing valuation through discounted cash flows presents a better lens for viewing cyclical companies, high-growth firms, businesses with finite lives (e.g., mines), or companies expected to generate negative earnings over the next few years. That said, we don't dismiss multiples altogether but rather use them as supporting cross-checks for our DCF-based fair value estimates. We also acknowledge that DCF models offer their own challenges (including a potential proliferation of estimated inputs and the possibility that the method may miss shortterm market-price movements), but we believe these negatives are mitigated by deep analysis and our longterm approach.

Morningstar's equity research group ("we," "our") believes that a company's intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth.

Four key components drive the Morningstar rating: (1) our assessment of the firm's economic moat, (2) our estimate of the stock's fair value, (3) our uncertainty around that fair value estimate and (4) the current market price. This process ultimately culminates in our singlepoint star rating.

1. Economic Moat

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm's long-term investment potential, but also in the actual calculation of our fair value estimates. An economic moat is a structural feature that allows a firm to sustain excess profits over a long period of time. We define economic profits as re-

turns on invested capital (or ROIC) over and above our estimate of a firm's cost of capital, or weighted average cost of capital (or WACC). Without a moat, profits are more susceptible to competition. We have identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

Companies with a narrow moat are those we believe are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those in which we have very high confidence that excess returns will remain for 10 years, with excess returns more likely than not to remain for at least 20 years. The longer a firm generates economic profits, the higher its intrinsic value. We believe low-quality, no-moat companies will see their normalized returns gravitate toward the firm's cost of capital more quickly than companies with moats.

When considering a company's moat, we also assess whether there is a substantial threat of value destruction, stemming from risks related to ESG, industry disruption, financial health, or other idiosyncratic issues. In this context, a risk is considered potentially value destructive if its occurrence would eliminate a firm's economic profit on a cumulative or midcycle basis. If we deem the probability of occurrence sufficiently high, we would not characterize the company as possessing an economic moat.

2. Estimated Fair Value

Combining our analysts' financial forecasts with the firm's economic moat helps us assess how long returns on invested capital are likely to exceed the firm's cost of capital. Returns of firms with a wide economic moat rating are assumed to fade to the perpetuity period over a longer period of time than the returns of narrow-moat firms, and both will fade slower than no-moat firms, increasing our estimate of their intrinsic value.

Our model is divided into three distinct stages:

Stage I: Explicit Forecast

In this stage, which can last five to 10 years, analysts make full financial statement forecasts, including items such as revenue, profit margins, tax rates, changes in workingcapital accounts, and capital spending. Based on these projections, we calculate earnings before interest, after taxes (EBI) and the net new investment (NNI) to de-

rive our annual free cash flow forecast.

Stage II: Fade

The second stage of our model is the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. During the Stage II period, we use a formula to approximate cash flows in lieu of explicitly modeling the income statement, balance sheet, and cash flow statement as we do in Stage I. The length of the second stage depends on the strength of the company's economic moat. We forecast this period to last anywhere from one year (for companies with no economic moat) to 10–15 years or more (for wide-moat companies). During this period, cash flows are forecast using four assumptions: an average growth rate for EBI over the period, a normalized investment rate, average return on new invested capital (RONIC), and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Stage III: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with estimated WACC.

Because a dollar earned today is worth more than a dollar earned tomorrow, we discount our projections of cash flows in stages I, II, and III to arrive at a total present value of expected future cash flows. Because we are modeling free cash flow to the firm—representing cash available to provide a return to all capital providers—we discount future cash flows using the WACC, which is a weighted average of the costs of equity, debt, and preferred stock (and any other funding sources), using expected future proportionate long-term, market-value weights.

3. Uncertainty Around That Fair Value Estimate

Morningstar's Uncertainty Rating is designed to capture the range of potential outcomes for a company's intrinsic value. This rating is used to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating is aimed at identifying the confidence we should have in assigning a fair value estimate for a given stock.

Our Uncertainty Rating is meant to take into account anything that can increase the potential dispersion of future outcomes for the intrinsic value of a company, and any-

Morningstar Equity Research Star Rating Methodology



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thing that can affect our ability to accurately predict these outcomes. The rating begins with a suggested rating produced by a quantitative process based on the trailing 12-month standard deviation of daily stock returns. An analyst overlay is then applied, with analysts using the suggested rating, historical rating data, and their own knowledge of the company to inform them as they make the final Uncertainty Rating decision. Ultimately, the rating decision rests with the analyst. Analysts take into account many characteristics when making their final decision, including cyclical factors, operational and financial factors such as leverage, company-specific events, ESG risks, and anything else that might increase the potential dispersion of future outcomes and our ability to estimate those outcomes.

Our recommended margin of safety—the discount to fair value demanded before we'd recommend buying or selling the stock—widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the potential dispersion of outcomes, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares. In addition, the Uncertainty Rating provides guidance in portfolio construction based on risk tolerance.

Our Uncertainty Ratings are: Low, Medium, High, Very High, and Extreme.

Margin of Safety

Qualitative Analysis	Uncertainty Ratings	★★★★★ Rating	★ Rating
Low	20% Discount	25% Premium	
Medium	30% Discount	35% Premium	
High	40% Discount	55% Premium	
Very High	50% Discount	75% Premium	
Extreme	75% Discount	300% Premium	

Our uncertainty rating is based on the interquartile range, or the middle 50% of potential outcomes, covering the 25th percentile–75th percentile. This means that when a stock hits 5 stars, we expect there is a 75% chance that the intrinsic value of that stock lies above the current market price. Similarly, when a stock hits 1 star, we expect there is a 75% chance that the intrinsic value of that stock lies below the current market price.

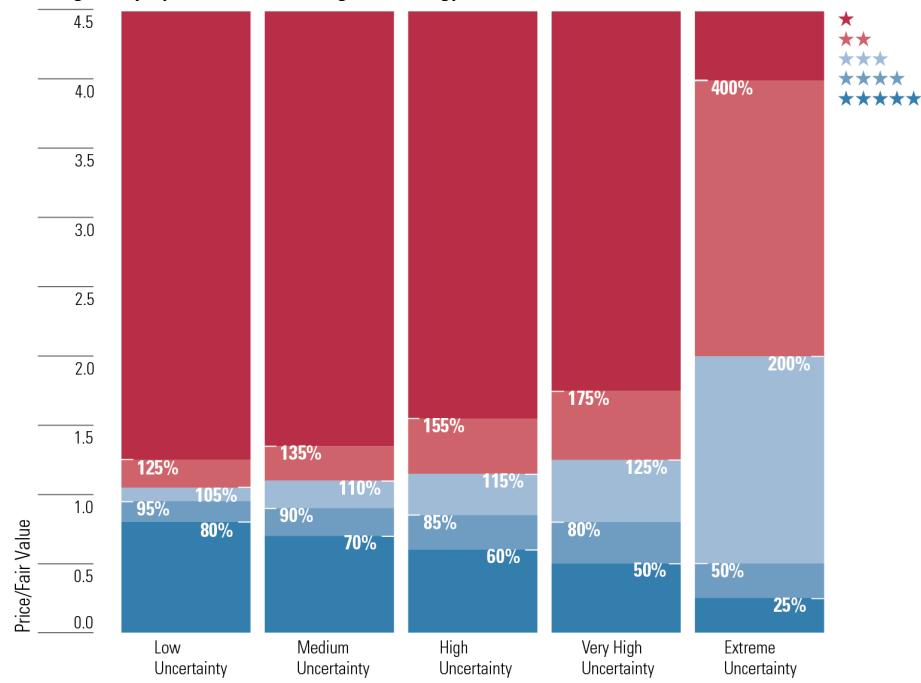
4. Market Price

The market prices used in this analysis and noted in the report come from exchange on which the stock is listed which we believe is a reliable source.

For more details about our methodology, please go to <https://shareholders.morningstar.com>

Morningstar Star Rating for Stocks

Morningstar Equity Research Star Rating Methodology



Once we determine the fair value estimate of a stock, we compare it with the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market on which the stock is listed is open. Our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted.

Please note, there is no predefined distribution of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued, in our opinion, than when very few companies garner our highest rating.

We expect that if our base-case assumptions are true the market price will converge on our fair value estimate over time generally within three years (although it is impossible to predict the exact time frame in which market prices may adjust).

Our star ratings are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors.

The Morningstar Star Ratings for stocks are defined below:

★★★★★ We believe appreciation beyond a fair risk ad-

justed return is highly likely over a multiyear time frame. Scenario analysis developed by our analysts indicates that the current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential.

★★★★ We believe appreciation beyond a fair risk-adjusted return is likely.

★★★ Indicates our belief that investors are likely to receive a fair risk-adjusted return (approximately cost of equity).

★★ We believe investors are likely to receive a less than fair risk-adjusted return.

★ Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear time frame, based on our analysis. Scenario analysis by our analysts indicates that the market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss.

Other Definitions

Last Price: Price of the stock as of the close of the market of the last trading day before date of the report.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments, and shareholder distributions. Analysts consider compa-

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ies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

Capital Allocation (or Stewardship) analysis published prior to Dec. 9, 2020, was determined using a different process. Beyond investment strategy, financial leverage, and dividend and share buyback policies, analysts also considered execution, compensation, related party transactions, and accounting practices in the rating.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments, and shareholder distributions. Analysts consider companies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

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Sustainalytics ESG Risk Rating Assessment: The ESG Risk Rating Assessment is provided by Sustainalytics; a Morningstar company.

Sustainalytics' ESG Risk Ratings measure the degree to which company's economic value at risk is driven by environment, social and governance (ESG) factors.

Sustainalytics analyzes over 1,300 data points to assess a company's exposure to and management of ESG risks. In other words, ESG Risk Ratings measures a company's unmanaged ESG Risks represented as a quantitative score. Unmanaged Risk is measured on an open-ended scale

starting at zero (no risk) with lower scores representing less unmanaged risk and, for 95% of cases, the unmanaged ESG Risk score is below 50.

Based on their quantitative scores, companies are grouped into one of five Risk Categories (negligible, low, medium, high, severe). These risk categories are absolute, meaning that a 'high risk' assessment reflects a comparable degree of unmanaged ESG risk across all subindustries covered.

The ESG Risk Rating Assessment is a visual representation of Sustainalytics ESG Risk Categories on a 1 to 5 scale. Companies with Negligible Risk = 5 Globes, Low Risk = 4, Medium Risk = 3 Globes, High Risk = 2 Globes, Severe Risk = 1 Globe. For more information, please visit sustainalytics.com/esg-ratings/

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