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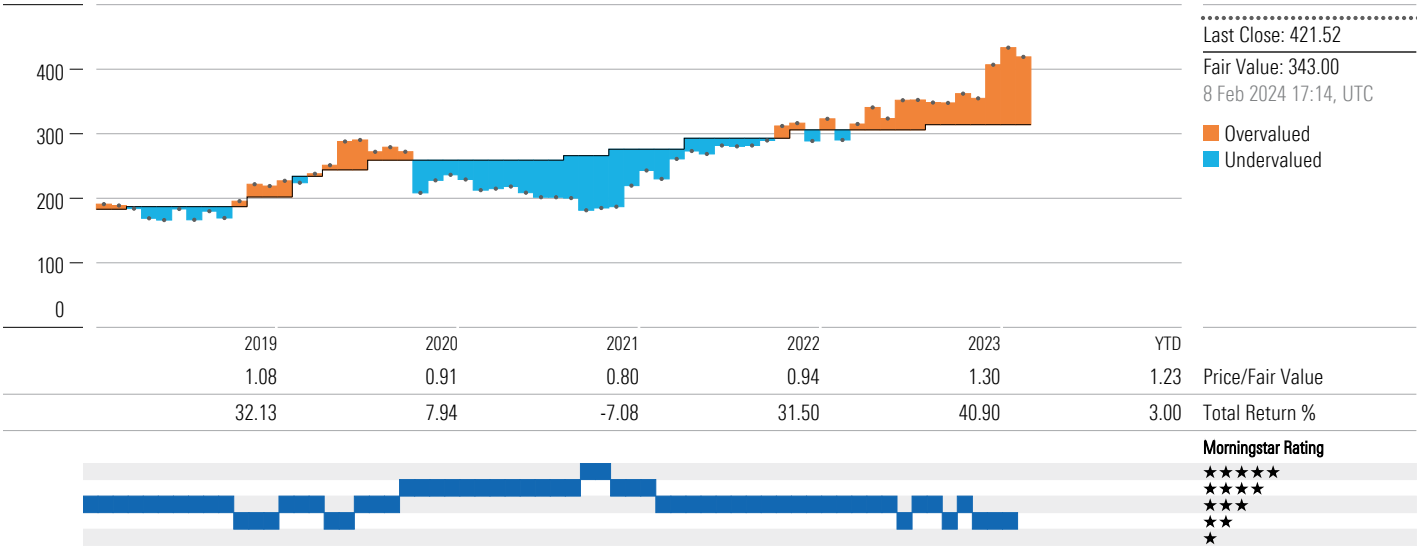
Vertex Pharmaceuticals Inc VRTX ★★ 8 Feb 2024 17:16, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
421.52 USD 8 Feb 2024	343.00 USD 8 Feb 2024 17:14, UTC	1.23	107.99 USD Bil 7 Feb 2024	Narrow	Large Growth	High	Standard	7 Feb 2024 06:00, UTC

Price vs. Fair Value



	2019	2020	2021	2022	2023	YTD	
	1.08	0.91	0.80	0.94	1.30	1.23	Price/Fair Value
	32.13	7.94	-7.08	31.50	40.90	3.00	Total Return %

Total Return % as of 7 Feb 2024. Last Close as of 8 Feb 2024. Fair Value as of 8 Feb 2024 17:14, UTC.

Contents

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

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

Vertex Earnings: Robust Uptake of Trikafta/Kaftrio Drives Sales; Pipeline Makes Significant Progress

Analyst Note Rachel Elfman, Equity Analyst, 8 Feb 2024

Vertex ended 2023 in a strong position thanks to strong uptake of its cystic fibrosis triple combination therapy, Trikafta/Kaftrio, which accounted for 91% total sales in 2023. Product revenue of $9.87 billion represented an 11% increase compared with 2022. In addition, Vertex's diverse pipeline in disease areas outside of cystic fibrosis is making significant advancements. Vertex is on track to submit two new drug applications to the U.S. Food and Drug Administration by mid-2024 for both VX-548 in acute pain and vanzacaftor triple in cystic fibrosis. We have increased our estimated probabilities of approval for these pipeline candidates to 65% in our base case and raised our fair value estimate to $343 per share from $314. Vertex's lengthy patent protections extending to 2037 and first-mover status in the lucrative cystic fibrosis market continue to support its narrow economic moat rating while also providing ample cash flow to support the development of its broad pipeline.

We anticipate 2024 will be a pivotal year as Vertex rolls out commercialization efforts for its recently approved gene therapy, Casgevy, which received approval in the U.S., Great Britain, Saudi Arabia, and Bahrain for the treatment of both sickle cell disease and transfusion-dependent beta thalassemia. We forecast Casgevy could hold strong pricing power and eventually become a blockbuster opportunity. We forecast nearly $10.7 billion in total product sales in 2024, representing growth of 8% over 2023.

In the fourth quarter, Vertex completed three studies evaluating the efficacy and safety of vanzacaftor

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Sector Healthcare

Industry Biotechnology

Business Description

Vertex Pharmaceuticals is a global biotechnology company that discovers and develops small-molecule drugs for the treatment of serious diseases. Its key drugs are Kalydeco, Orkambi, Symdeko, and Trikafta/Kaftrio for cystic fibrosis, where Vertex therapies remain the standard of care globally. Vertex is diversifying its pipeline through gene-editing therapies such as CTX001 for beta thalassemia and sickle-cell disease, small-molecule inhibitors targeting acute and chronic pain using nonopioid treatments, and small-molecule inhibitors of APOL1-mediated kidney diseases. Vertex is also investigating cell therapies to deliver a potential functional cure for type 1 diabetes.

triple relative to Trikafta in people with cystic fibrosis 6 years of age and older. This is a once-daily triple-combination regimen compared with Trikafta/Kaftrio, which is taken twice daily. The results from these studies were positive, and they met the primary endpoint and all key secondary endpoints. Pending approval, we anticipate vanzacaftor triple could generate sales as early as 2025.

Business Strategy & Outlook Rachel Elfman, Equity Analyst, 8 Feb 2024

Vertex Pharmaceuticals was known for discovering blockbuster hepatitis C drug Incivek, which is now overshadowed by the company's robust cystic fibrosis franchise. Vertex's approved cystic fibrosis drugs—Kalydeco, Orkambi, Symdeko, and Trikafta—will make the firm eligible to treat about 90% of the CF population, assuming international and pediatric approvals. We expect Vertex to maintain its dominant position in CF, given the strong efficacy of its therapies, lengthy patents, and lack of competition, while developing pipeline candidates in other rare indications to spur growth.

CF is a rare indication characterized by a progressive and deadly decline in lung function, affecting approximately 83,000 people worldwide. Since its 2012 launch, Kalydeco has captured most of its target patient population (less than 10% of CF patients with specific genetic mutations) and has become the backbone of combination therapies including Orkambi, Symdeko, and Trikafta. Orkambi's launch in 2015 expanded the eligible patient population by adding CF patients with homozygous F508del mutations, but its uptake was slower because of its safety profile. Symdeko's 2018 launch didn't come with any worries over safety and contributed over $700 million in revenue in its first year, targeting the same population as Orkambi plus some additional patients. Trikafta, a triple-combination therapy, has had a very strong launch since its U.S. approval in 2019 and significantly expanded the company's addressable patient population to heterozygous patients.

Vertex's comprehensive approach has already shaped the treatment of CF and earned it a dominant position worldwide. The chronic nature of therapy and limited competition on the horizon heighten the CF market's attractiveness.

Vertex's pipeline candidates are continuing to make progress, and we await additional data readouts for Vertex's candidates across type 1 diabetes, APOL1-mediated kidney disease, and alpha-1 antitrypsin deficiency. We think the CF franchise will provide ample cash flow for the development of these candidates.

Bulls Say Rachel Elfman, Equity Analyst, 8 Feb 2024

- The firm's CF therapies are poised to dominate the lucrative market for the foreseeable future, based on the disease-modifying potential of the drugs, chronic use by patients, and limited competition.
- Vertex's leading drug candidates were mostly discovered in-house, lending credibility to its drug-discovery technology and potential to generate additional pipeline candidates.

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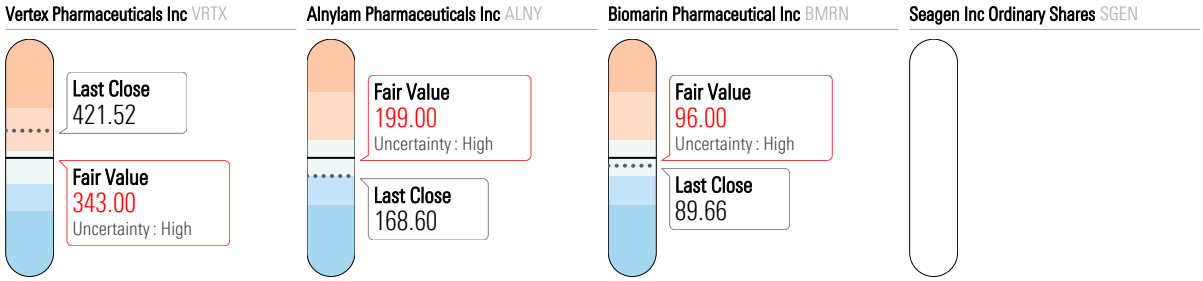
Competitors



	Vertex Pharmaceuticals Inc VRTX	Alnylam Pharmaceuticals Inc ALNY	Biomarin Pharmaceutical Inc BMRN	Seagen Inc Ordinary Shares SGEN
Economic Moat	Narrow	Narrow	Narrow	—
Currency	USD	USD	USD	—
Fair Value	343.00 8 Feb 2024 17:14, UTC	199.00 4 Aug 2022 06:55, UTC	96.00 28 Feb 2023 14:35, UTC	— —
1-Star Price	531.65	308.45	148.80	—
5-Star Price	205.80	119.40	57.60	—
Assessment	Overvalued 7 Feb 2024	Fairly Valued 7 Feb 2024	Fairly Valued 7 Feb 2024	— —
Morningstar Rating	★★8 Feb 2024 17:16, UTC	★★★7 Feb 2024 22:21, UTC	★★★7 Feb 2024 22:21, UTC	— —
Analyst	Rachel Elfman, Equity Analyst	Rachel Elfman, Equity Analyst	Karen Andersen, Strategist	—
Capital Allocation	Standard	Standard	Standard	—
Price/Fair Value	1.23	0.85	0.93	—
Price/Sales	11.06	12.16	7.41	19.52
Price/Book	6.14	142.92	3.45	14.91
Price/Earning	30.17	—	116.44	—
Dividend Yield	—	—	—	—
Market Cap	107.99 Bil	21.16 Bil	16.89 Bil	696.54 Bil
52-Week Range	283.60—448.40	148.10—227.91	76.02—111.79	2,994.97—3,711.48
Investment Style	Large Growth	Mid Growth	Mid Growth	Mid Growth

- Vertex's combination therapies have lengthy patents, protecting the profitable cystic fibrosis portfolio from generics.

Bears Say Rachel Elfman, Equity Analyst, 8 Feb 2024

- Vertex is highly dependent on the success of its cystic fibrosis franchise, and it could fail to diversify if its other pipeline candidates are not successful.
- Pricing pressure could erode returns, given the high price tag of Vertex's therapies.
- Gene-editing programs could disrupt Vertex's hold in the CF market.

Economic Moat Rachel Elfman, Equity Analyst, 8 Feb 2024

Vertex's portfolio of patent-protected cystic fibrosis drugs forms the basis of our narrow economic moat rating. The company is well supported by lengthy patent protections extending as far as 2037 and first-mover status in the lucrative cystic fibrosis market. Additionally, Vertex holds significant patient share as nearly 50% of patients worldwide are currently treated for cystic fibrosis using its medicines. More than 30,0000 additional patients worldwide who are currently untreated will be able to seek treatment using

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Vertex's recently approved triple combination regimen, Trikafta/Kaftrio. Vertex's marketed drugs Kalydeco, Orkambi, Symdeko, and Trikafta/Kaftrio are the only disease-modifying cystic fibrosis drugs on the market that restore cystic fibrosis transmembrane conductance regulator, or CFTR. They restore proper function to the CFTR protein or correct its production process so that a normal protein is made. Vertex's portfolio makes up the backbone of cystic fibrosis therapy and supports strong pricing power.

Cystic fibrosis is a genetic disorder affecting roughly 88,000 people worldwide that causes a progressive and deadly decline in the function of the lungs and digestive system. While the number of patients is small, the six-figure pricing for Vertex's disease-modifying drugs creates megablockbuster sales. Vertex's cystic fibrosis portfolio has experienced a pretty welcoming commercial and regulatory environment due to the rarity of cystic fibrosis and the lack of disease-modifying treatments. The market's attractiveness is heightened by the chronic nature of therapy and limited competition due to the complexity of developing efficient drugs to treat the disease.

Intangible assets are the key moat source for Vertex, as the company benefits from lengthy patent protections for each of its four cystic fibrosis therapies currently on the market. Vertex has been able to build upon its intellectual property, developing better drug combinations that increasingly capture a greater number of patients with various cystic fibrosis mutations. Kalydeco, approved in 2012 for patients with one copy of the G551D mutation, quickly picked up label expansions in additional mutations and age groups, which expanded the eligible patient population from about 1,000 patients in the U.S. when first approved to over 4,000 by 2015. Orkambi was approved in 2015 for patients with two copies of the common F508del mutation. Orkambi expanded the eligible patient population significantly, to over 30,000 globally by the end of 2016. Symdeko, approved in 2018, didn't significantly expand the addressable population as it targets the same patient population as Orkambi, but it helped capture some additional patients due to its better efficacy.

Trikafta was approved in the United States in 2019, and it was approved in the European Union in 2020 under the name Kaftrio. Trikafta/Kaftrio is a triple combination regimen that further expands the eligible patient population by an additional 30,000 patients worldwide. Just since the beginning of 2021, Trikafta/Kaftrio has been approved and reimbursed/accessible in 12 countries outside the U.S., including Denmark, Germany, Ireland, Israel, Switzerland, the United Kingdom, and Australia. Vertex is awaiting the potential approval of Trikafta in many other countries and in pediatric patients not yet approved for the drug, but we think the eligible patient population for Vertex's four therapies will reach about 75,000 people, or roughly 90% of all cystic fibrosis patients. Only 10% of cystic fibrosis patients have a genetic mutation that is not currently able to be treated with any of Vertex's four drugs on the market.

Vertex's strategy has been to use its intangible assets and expertise to build upon its first cystic fibrosis drug, Kalydeco. Symdeko and Orkambi are doublet combinations that add a CFTR corrector to Kalydeco,

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a CFTR potentiator. Vertex's most recent drugs to receive approval, Trikafta/Kaftrio, which are triple combination regimens, build on molecules in Symdeko and Kalydeco while layering in a new CFTR corrector, elexacaftor. The complexity and unique mechanism of these drugs results in a new, efficacious therapy that serves as a competitive advantage for Vertex. Many competitors study their own drug pipeline candidates in combination with one or more of Vertex's molecules, illustrating Vertex's position as the backbone of treatment options.

Vertex commands strong pricing power because cystic fibrosis is a rare, chronic condition and there are no alternative disease-modifying treatment options currently on the market. Many patients start treatment for cystic fibrosis in early childhood and continue throughout their lifetime. Trikafta's U.S. list price at launch reached $311,000, exhibiting the company's strong pricing power. We estimate that Kalydeco, Orkambi, and Symdeko all command pricing upward of $230,000-$250,0000 a year for their therapies.

We believe Vertex does not face significant competition in the cystic fibrosis market. Galapagos (in partnership with AbbVie) was previously its closest competitor, but in 2018 it reported lackluster phase 2 results for its lead candidates, illustrating the high bar of efficacy from Vertex's portfolio. AbbVie initially stepped away from further trials, but then it entered into an agreement to license a cystic fibrosis asset from the Cystic Fibrosis Foundation in October 2019. AbbVie was in the process of two phase 2 studies conducted with the Therapeutics Development Network. In 2022, Abbvie discontinued its research into cystic fibrosis.

We don't think Vertex's pipeline outside of cystic fibrosis contributes to its narrow moat, as many of its assets are in relatively early stages of development. However, with Vertex's substantial cash flow, we think the company is well positioned to continue the research and development of drugs for several rare diseases over the next decade. Further, the pipeline's focus on rare indications with few or no approved treatment options will likely support pricing power. Therefore, we believe it is more likely than not that Vertex will be able to earn excess returns over the next 10 years and warrants a narrow economic moat rating.

Fair Value and Profit Drivers Rachel Elfman, Equity Analyst, 8 Feb 2024

We have raised our fair value estimate to $343 per share from $314 to reflect our increased estimated probabilities of approval for VX-548 in acute pain and vanzacaftor triple in cystic fibrosis. Vertex is on track to submit two new drug applications to the U.S. Food and Drug Administration by mid-2024 for these pipeline candidates, which have reported positive data in phase 3 trials.

We forecast nearly $10.7 billion in total product sales in 2024, representing growth of 8% over 2023, largely driven by Trikafta/Kaftrio, which treats both F508del homozygous and heterozygous patients. Vertex's portfolio of cystic fibrosis therapies allows it to reach 90% of CF patients globally, assuming

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international and pediatric approvals.

We anticipate 2024 will be a pivotal year for Vertex as it rolls out commercialization efforts for its recently approved gene therapy, Casgevy, which received approval in the United States, Great Britain, Saudi Arabia, and Bahrain for the treatment of both sickle cell disease and transfusion-dependent beta thalassemia. We forecast Casgevy could hold strong pricing power and eventually become a blockbuster opportunity. We like that two additional phase 3 studies have been initiated to evaluate Casgevy in pediatric patients, which would broaden the addressable patient population, if approved.

Vertex is using its ample cash-on-hand from its CF franchise to fund the development of a diverse pipeline, including treatments for kidney disease, type 1 diabetes, and pain, and its pipeline spans multiple drug classes. Vertex is targeting several blockbuster opportunities, which we forecast will contribute over $7 billion in 2033 pipeline sales.

Vertex completed three studies evaluating the efficacy and safety of vanzacaftor triple relative to Trikafta in people with cystic fibrosis 6 years of age and older. This is a once-daily triple-combination regimen compared with Trikafta/Kaftrio, which is taken twice daily. The results from these studies were positive, and they met the primary endpoint and all key secondary endpoints. Pending approval, we anticipate vanzacaftor triple could generate sales as early as 2025.

We forecast that selling, general, and administrative expenses as a percentage of sales will be in the low double digits throughout our forecast period. We anticipate research and development spending will steadily decline as a percentage of sales over the next 10 years (from 37% in 2023 to about 31% in 2033) as the company develops its pipeline candidates and brings them to market.

Risk and Uncertainty Rachel Elfman, Equity Analyst, 8 Feb 2024

We assign Vertex a High Morningstar Uncertainty Rating. Chronic therapies for rare diseases are often priced above cost-effective levels, and Vertex's cystic fibrosis therapies are priced at least 3 times the level that cost-effectiveness watchdog ICER would deem cost-effective.

We expect Vertex could see reduced exposure to potential pricing pressure with time, particularly if the firm makes headway with its gene editing programs (Casgevy for rare blood disorders) and cell therapy (VX-880 for type 1 diabetes). Gene and cell therapies have the potential to provide cost-effective, one-time therapies, as shown by recent reviews for approved therapies like Gilead's Yescarta and Novartis' Zolgensma.

Less cost-effective drugs like Vertex's Trikafta/Kaftrio could face U.S. pricing pressure from potential disruptive drug pricing reforms, and our uncertainty rating accounts for potential pricing pressure from payers or regulators that may depress returns. Also, Vertex's sales from the U.S. are high compared with

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its biopharma peer group, which gives more weight to U.S. pricing decisions.

That said, Vertex's concentration in cystic fibrosis is offset by its dominant position and lack of competition. We think the lack of close competition and strong cash generation in the medium term provide a solid cushion, which should allow Vertex to continue diversifying and expanding its pipeline. Vertex's therapies are disease-modifying, but they do not correct the underlying genetic mutation, which leaves room for improvement. While Vertex has a next-generation pipeline in CF correctors and gene editing, competition in gene editing could disrupt the company's successful franchise.

Product governance is also an environmental, social, and governance risk, as failure to adhere to extensive regulations and quality management standards can lead to expensive recalls, increased regulatory scrutiny, compliance costs, and lawsuits from affected customers.

Capital Allocation Rachel Elfman, Equity Analyst, 3 Aug 2023

We assign Vertex a Standard Capital Allocation Rating. Our analysis evaluates what we determine to be the three key facets of management decision-making from the perspective of shareholders: balance sheet strength, investment efficacy, and distributions. Our Standard rating results from a sound balance sheet, fair investment strategy, and an assessment of shareholder distributions as appropriate.

Vertex's balance sheet is sound, with revenue cyclicality and operating leverage each possessing a medium rating. The company is in strong financial health, thanks to its robust cash flow generation and low debt. As of year-end 2022, Vertex held over $10.5 billion in cash and equivalents.

We view Vertex's investment decisions as fair, and economic profit is increasing throughout our explicit forecast period. In 2019, management wisely allocated capital toward diversifying the pipeline, which included two acquisitions of private biotechnology companies, each presenting a unique market opportunity. Vertex bought Exonics Therapeutics (gene editing in Duchenne muscular dystrophy) for $266 million up front (plus milestones) and Semma Therapeutics (human-derived stem cell islets to cure type 1 diabetes) for $937 million. While these assets remain in early stages of development, we like management's focus on diversifying Vertex's pipeline to ensure future growth, which is well before any of its CF patents reach their expiration. The company is also investing in gene-editing technology in order to create even more innovative and effective cystic fibrosis drugs. We expect Vertex will continue investing in a more diversified rare-disease portfolio as it looks beyond the cystic fibrosis market.

Finally, we assess overall shareholder distributions as appropriate. Even though the company does not currently pay a dividend, we view this as appropriate since Vertex is growing quickly and reinvesting in R&D helps build its value and support its narrow moat.

Dr. Jeffrey Leiden became CEO and chair in 2012. His experience includes a role as managing director at

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Clarus Ventures as well as president and chief operating officer at Abbott. His experience in Big Pharma shone through as he brought Vertex from the cash-burning stage of an emerging biotech to a large, leading biotech firm with an expansive franchise in cystic fibrosis therapies. He has stepped down as CEO but remains on the board as executive chair.

Former chief medical officer Dr. Reshma Kewalramani took on the CEO role in April 2020. Before joining Vertex in 2017, Kewalramani spent over a decade at Amgen. We believe she is well suited to lead Vertex as it expands outside of its cystic fibrosis franchise.

The rest of the management team is composed of other Big Pharma veterans with adequate levels of experience, in our view. Previous CFO Ian Smith was abruptly terminated in early 2019 because of personal behavior. While no details were disclosed, we have no reason to believe that this significantly weighs on the company's stewardship.

Historical controversies related to compensation and other practices don't affect our rating for the current team. We think management compensation has been historically high, although recent measures spurred by a shareholder vote have curtailed the amounts going forward. In 2014, Leiden's total compensation was $36.6 million, and several senior managers had compensation packages above $10 million. In 2015, Leiden’s total compensation dropped to $28 million in response to shareholder disapproval, and in 2020, it dropped to about $16.5 million. The company has also been probed by the Securities and Exchange Commission for a series of large insider stock sales on positive clinical news in past years.

Analyst Notes Archive

Crispr and Vertex: FDA Approves Gene Editing Drug for Sickle Cell Disease; Positive Long-Term Outlook Rachel Elfman, Equity Analyst, 11 Dec 2023

Crispr Therapeutics and Vertex Pharmaceuticals received approval from the U.S. Food and Drug Administration for Casgevy (pipeline candidate: Exa-cel), the world's first medicine using Crispr technology to modify genes. Casgevy received approval for the treatment of sickle cell disease in people 12 years and older with recurrent vaso-occlusive crises, which is what happens when sickled red blood cells block blood flow and deprive tissues of oxygen. The companies announced a wholesale acquisition cost for Casgevy in the U.S. of $2.2 million, in line with our estimated global average net selling price of $1.5 million. We await another FDA decision in March 2024 for the potential approval of Exa-cel for the blood disease beta thalassemia. This indication already received regulatory approval in the U.K. in November, and we assign it an 85% probability of approval in the U.S..

We maintain our fair value estimates of $119 per share for Crispr Therapeutics and $314 per share for Vertex Pharmaceuticals. We view shares of Crispr as undervalued for long-term investors with a high

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degree of risk tolerance, as shares are trading in 4-star territory about 46% below our fair value estimate. We view shares of Vertex as fairly valued, currently trading in 3-star territory.

Despite Casgevy's approval, investors reacted by sending Crispr's stock down about 16%. The FDA simultaneously announced the approval of Bluebird Bio's gene therapy for sickle cell disease called Lyfgenia, with a wholesale acquisition price of $3.1 million. We think investors were expecting a higher wholesale acquisition cost for Casgevy, especially since Lyfgenia's approval came with a black box warning about the possibility of blood cancer (two patients developed acute myelogenous leukemia in clinical trials of Lyfgenia and died). However, we think Casgevy could achieve stronger patient uptake due to its lower price and lack of a black box warning, which supports our positive long-term outlook for Casgevy.

Vertex Earnings: Strong Demand for Trikafta/Kaftrio Drives Sales; Pipeline Continues to Make Progress Rachel Elfman, Equity Analyst, 7 Nov 2023

Vertex reported third-quarter results highlighted by strong uptake of its cystic fibrosis triple combination therapy, Trikafta/Kaftrio, in the United States and internationally. Quarterly product revenue of $2.48 billion represented a 6% increase from the prior-year period. Vertex's results are tracking our expectations, and we maintain our fair value estimate of $314 per share.

Trikafta/Kaftrio accounted for about 92% of total sales during the quarter. We forecast about $9.85 billion in revenue for 2023, representing growth of 10% over 2022. Vertex's lengthy patent protections and first-mover status in the lucrative cystic fibrosis market continue to support its narrow economic moat rating.

We maintain our positive outlook for Vertex's gene-editing candidate, exa-cel, which is being developed in partnership with CRISPR Therapeutics for two blood diseases—transfusion-dependent beta thalassemia and sickle cell disease. We assign a 60% probability of approval to exa-cel and anticipate it could reach the market as early as 2024. We forecast exa-cel could hold strong pricing power and become a blockbuster opportunity. In Vertex's agreement with CRISPR Therapeutics, Vertex would have a 60% share of exa-cel's sales. Exa-cel has an FDA regulatory action date in December for the sickle cell disease indication and a target action date in March 2024 for the beta thalassemia indication.

We appreciate that Vertex is using its ample cash flow from its cystic fibrosis business to diversify its drug portfolio and invest in novel therapeutic areas. Vertex's pipeline candidates are continuing to make progress, and we await additional data readouts for Vertex's candidates across type 1 diabetes, pain, APOL1-mediated kidney disease, and Alpha-1 Antitrypsin Deficiency. On a probability-weighted basis, we forecast Vertex's pipeline candidates could account for roughly 30% of total revenue by the end of our 10-year forecast period.

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Vertex Earnings: Strong Uptake of Trikafta/Kaftrio Drives Growth; Raising Fair Value Estimate 3%

Rachel Elfman, Equity Analyst, 3 Aug 2023

Vertex Pharmaceuticals reported strong second-quarter results driven by the continued robust uptake of its cystic fibrosis triple-combination therapy, Trikafta/Kaftrio. Product revenue of $2.49 billion represented a 14% increase from the prior-year period. Management raised its 2023 revenue guidance by 1.3% at the midpoint to reflect strong demand for Trikafta/Kaftrio across multiple countries. We have raised our fair value estimate to $314 per share from $306 to reflect Vertex's strong performance.

Trikafta/Kaftrio accounted for about 90% of total sales during the quarter. We forecast about $9.76 billion in revenue for 2023, representing growth of 9% over 2022. Vertex's lengthy patent protections and first-mover status in the lucrative cystic fibrosis market continue to support its narrow moat rating. We have a positive outlook for the company thanks to a diverse pipeline that is continuing to make progress.

Vertex's most advanced pipeline candidate is its gene-editing drug, exa-cel, which is being developed in partnership with CRISPR Therapeutics as a one-time functional cure for two blood diseases: transfusion-dependent beta thalassemia and sickle-cell disease. We assign a 60% probability of approval to exa-cel and anticipate it could reach the market as early as 2024. We forecast exa-cel could hold strong pricing power and become a blockbuster opportunity. In Vertex's agreement with CRISPR Therapeutics, Vertex would have a 60% share of exa-cel's sales.

We like that Vertex is using its ample cash flow from its cystic fibrosis business to diversify its drug portfolio. Its pipeline candidates are continuing to make progress; we await additional data readouts for Vertex's candidates across APOL1-mediated kidney disease, alpha-1 antitrypsin deficiency, type 1 diabetes, and pain. On a probability-weighted basis, we forecast Vertex's pipeline candidates could account for roughly 30% of total revenue by the end of our 10-year forecast period.

Vertex Earnings: Robust Demand for Cystic Fibrosis Drugs; Diverse Pipeline Makes Progress Rachel Elfman, Equity Analyst, 3 May 2023

Vertex reported healthy first-quarter results driven by continued robust demand for its cystic fibrosis triple-combination therapy, Trikafta/Kaftrio. Quarterly product revenue of $2.37 billion represented a 13% increase from the prior-year period. Vertex is tracking our expectations, and we maintain our fair value estimate of $306 per share and view shares as fairly valued. Vertex's lengthy patent protections and first-mover status in the lucrative cystic fibrosis market continue to support its narrow economic moat. The company's positive moat trend is based on its cystic fibrosis drug approvals and its diverse pipeline that continues to make progress.

We forecast over $9.6 billion in revenue for 2023, and we continue to have a positive outlook as Vertex's

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Vertex Pharmaceuticals Inc VRTX ★★ 8 Feb 2024 17:16, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
421.52 USD 8 Feb 2024	343.00 USD 8 Feb 2024 17:14, UTC	1.23	107.99 USD Bil 7 Feb 2024	Narrow	Large Growth	High	Standard	7 Feb 2024 06:00, UTC

pipeline develops. Vertex's most advanced pipeline candidate is its gene-editing drug, exa-cel, which is being developed in partnership with CRISPR Therapeutics for two blood diseases: transfusion-dependent beta thalassemia and sickle cell disease. Exa-cel's regulatory submissions were completed in the EU, U.K., and U.S., and Vertex awaits a regulatory decision.

Vertex and CRISPR have presented promising phase 3 data for exa-cel demonstrating that the drug has the potential to be a durable, one-time functional cure. We assign a 60% probability of approval to exa-cel and anticipate it could reach the market as early as 2024. We forecast exa-cel could hold strong pricing power and become a blockbuster opportunity. We like that two additional phase 3 studies have been initiated to evaluate exa-cel in pediatric patients, which would broaden the addressable patient population, if approved.

Robust demand for Vertex's highly effective drug, Trikafta/Kaftrio, is due to the drug's rapid uptake in the U.S. and strong performance in multiple countries internationally. Trikafta/Kaftrio accounted for 88% of total sales for the quarter.

Narrow-Moat Vertex Reports Strong Q4 Results Thanks to Robust CF Portfolio; Shares Fairly Valued

Rachel Elfman, Equity Analyst, 8 Feb 2023

Vertex reported strong fourth-quarter results driven by robust performance of its cystic fibrosis, or CF, drugs. Fourth-quarter revenue was over $2.3 billion, and fiscal 2022 revenue exceeded $8.9 billion, representing an 18% increase from the previous year. We don't anticipate a significant change to our fair value estimate of $306 per share, and we view shares as currently fairly valued. Vertex's lengthy patent protections and first-mover status in the lucrative cystic fibrosis market continue to support its narrow economic moat rating. We maintain Vertex's positive moat trend rating based on its CF drug approvals and its diverse pipeline that continues to make progress, with multiple clinical milestones expected in 2023.

Robust demand for Vertex's cystic fibrosis triple combination therapy, Trikafta/Kaftrio, accounted for 86% of total 2022 sales, up from 75% in 2021, thanks to the drug's rapid uptake in the U.S. and strong performance in multiple countries internationally. Management's CF revenue guidance for 2023 is largely within our expectations, and we anticipate over $9.6 billion in CF sales for the year.

We continue to have a positive outlook for Vertex's gene-editing candidate, exa-cel, which is being developed in partnership with CRISPR Therapeutics for two blood diseases—transfusion-dependent beta thalassemia and sickle cell disease. Exa-cel's regulatory submissions were validated in the E.U. and U.K. in December 2022, and Vertex expects to complete its submission in the U.S. by the end of the first quarter of 2023.

Vertex and CRISPR have presented promising phase 3 data for exa-cel demonstrating that the drug has

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Vertex Pharmaceuticals Inc VRTX ★★ 8 Feb 2024 17:16, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
421.52 USD 8 Feb 2024	343.00 USD 8 Feb 2024 17:14, UTC	1.23	107.99 USD Bil 7 Feb 2024	Narrow	Large Growth	High	Standard	7 Feb 2024 06:00, UTC

the potential to be a durable, one-time functional cure. We like that two additional phase 3 studies have been initiated to evaluate exa-cel in pediatric patients, which would broaden the addressable patient population if approved. We assign a 45% probability of approval to exa-cel and anticipate it could reach the market as early as 2023.

Narrow-Moat Vertex Maintains Strong CF Performance; Raising FVE to $306; Shares Fairly Valued

Rachel Elfman, Equity Analyst, 1 Nov 2022

Vertex continues to report strong performance in its cystic fibrosis (CF) business and solid progress for its developing pipeline. The company reported third-quarter results highlighted by $2.3 billion in revenue, representing an 18% increase from the prior year period. Management raised its 2022 revenue guidance by nearly 2% at the midpoint thanks to continued robust demand for its key cystic fibrosis triple combination therapy Trikafta/Kaftrio. Vertex's pipeline candidates are also continuing to make progress. After adjusting our near-term forecasts to reflect the strong uptake of Trikafta/Kaftrio both within and outside of the U.S., we now forecast $8.9 billion in cystic fibrosis revenue this year. We raised our fair value estimate to $306 per share from $293. We view shares as fairly valued, currently trading in 3-star territory. We maintain our Narrow Moat and positive trend ratings, which are supported by Vertex's strong intangible assets and diverse pipeline.

We continue to have a positive outlook for Vertex's gene-editing candidate, exa-cel, which is being developed in partnership with CRISPR Therapeutics for two blood diseases - transfusion-dependent beta thalassemia and sickle cell disease. Vertex and CRISPR have presented promising phase 3 data for exa-cel demonstrating that the drug has the potential to be a durable, one-time functional cure. We like that two additional phase 3 studies have been initiated to evaluate exa-cel in pediatric patients, which would broaden the addressable patient population if approved. We assign a 45% probability of approval to exa-cel and anticipate it could reach the market as early as 2023. By 2031, we forecast Vertex could receive $2.7 billion in probability-weighted revenue from exa-cel. Vertex remains on track to complete FDA regulatory filings for exa-cel by the end of the first quarter of 2023, and it expects to submit filings in Europe and the U.K. by the end of 2022.

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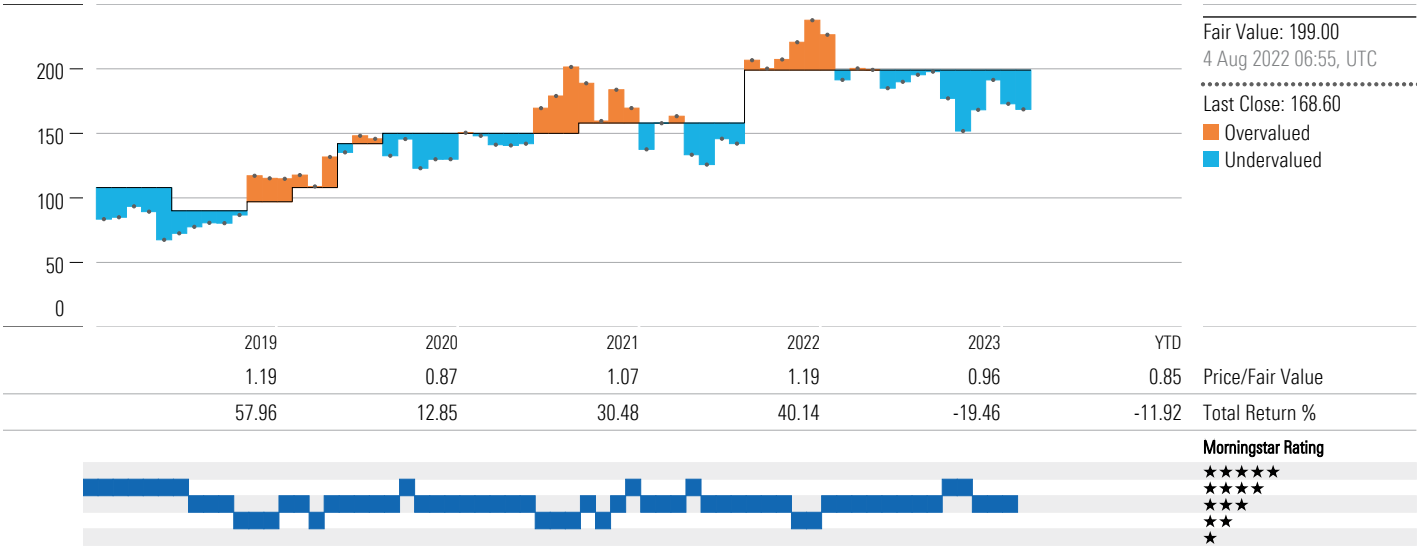
Vertex Pharmaceuticals Inc VRTX ★★ 8 Feb 2024 17:16, UTC

Competitors Price vs. Fair Value

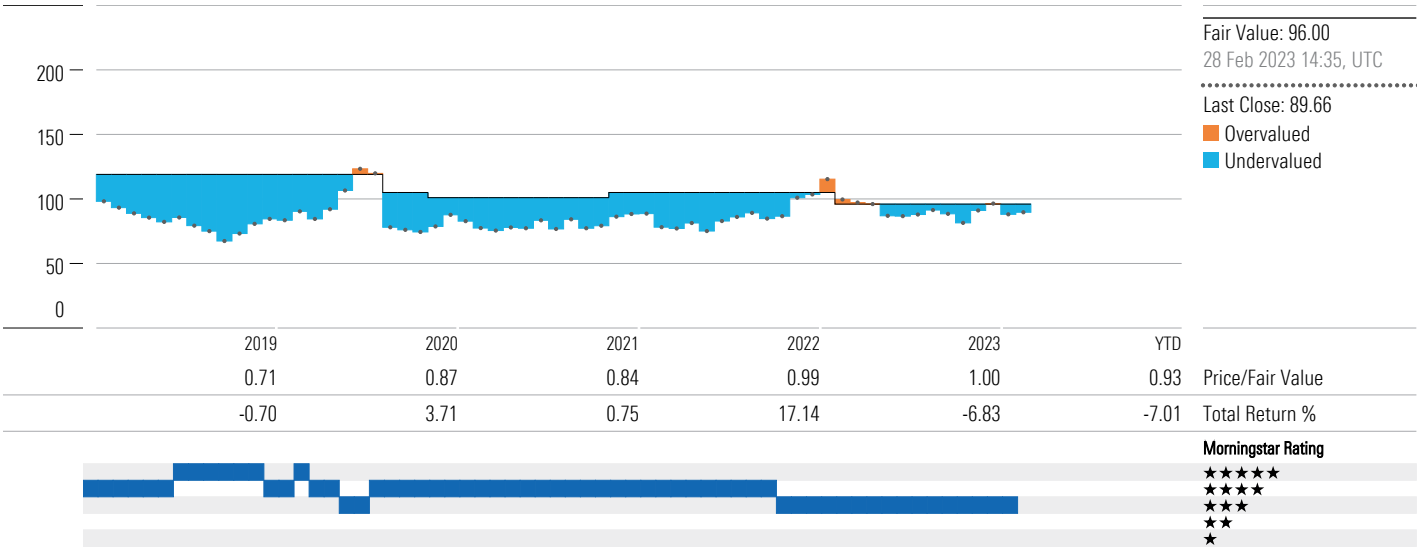
Alnylam Pharmaceuticals Inc ALNY



	2019	2020	2021	2022	2023	YTD	
	1.19	0.87	1.07	1.19	0.96	0.85	Price/Fair Value
	57.96	12.85	30.48	40.14	-19.46	-11.92	Total Return %

Total Return % as of 7 Feb 2024. Last Close as of 7 Feb 2024. Fair Value as of 4 Aug 2022 06:55, UTC.

Biomarin Pharmaceutical Inc BMRN



	2019	2020	2021	2022	2023	YTD	
	0.71	0.87	0.84	0.99	1.00	0.93	Price/Fair Value
	-0.70	3.71	0.75	17.14	-6.83	-7.01	Total Return %

Total Return % as of 7 Feb 2024. Last Close as of 7 Feb 2024. Fair Value as of 28 Feb 2023 14:35, UTC.

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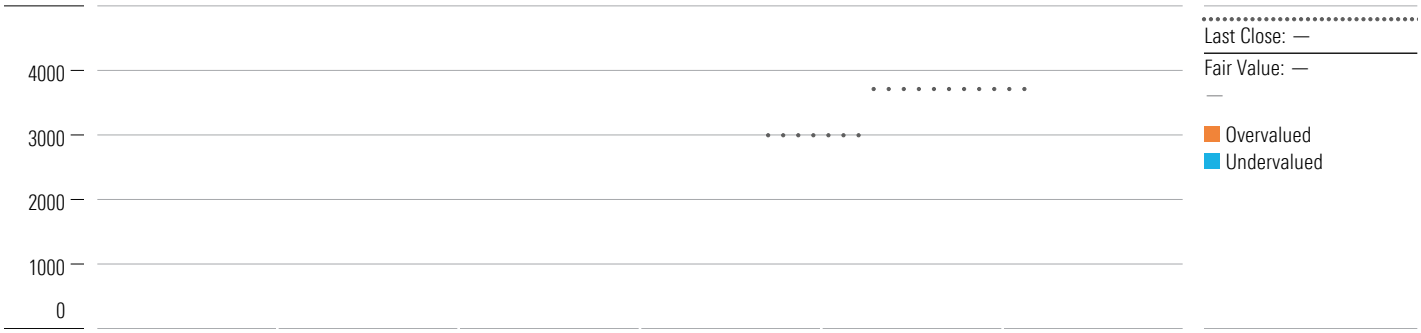
Vertex Pharmaceuticals Inc VRTX ★★ 8 Feb 2024 17:16, UTC

Seagen Inc Ordinary Shares SGEN



	2019	2020	2021	2022	2023	YTD	
	—	—	—	—	—	—	Price/Fair Value
	—	—	—	—	23.92	0.00	Total Return %

Morningstar Rating

No data available

Total Return % as of 7 Feb 2024. Last Close as of —. Fair Value as of —.

Vertex Pharmaceuticals Inc VRTX ★★ 8 Feb 2024 17:16, UTC

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Morningstar Historical Summary

Financials as of 30 Sep 2023

Fiscal Year, ends 31 Dec	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	YTD	TTM
Revenue (USD K)	580,415	1,032,336	1,702,177	2,488,652	3,047,597	4,162,800	6,205,700	7,574,400	8,930,700	—	7,351,500	9,654,200
Revenue Growth %	-52.1	77.9	64.9	46.2	22.5	36.6	49.1	22.1	17.9	—	10.9	11.0
EBITDA (USD K)	-598,755	-411,251	75,464	115,006	745,132	1,560,300	3,284,600	2,917,500	4,435,500	—	3,388,000	4,514,800
EBITDA Margin %	-103	-39.8	4.4	4.6	24.5	37.5	52.9	38.5	49.7	—	46.1	46.8
Operating Income (USD K)	-641,487	-464,673	11,198	392,829	663,966	1,202,000	2,869,400	3,892,300	4,365,400	—	3,351,500	4,409,400
Operating Margin %	-110	-45.0	0.7	15.8	21.8	28.9	46.2	51.4	48.9	—	45.6	45.7
Net Income (USD K)	-738,555	-556,334	-112,052	263,484	2,096,896	1,176,800	2,711,700	2,342,100	3,322,000	—	2,650,800	3,469,700
Net Margin %	-127	-53.9	-6.6	10.6	68.8	28.3	43.7	30.9	37.2	—	36.1	35.9
Diluted Shares Outstanding (K)	235,307	241,312	244,685	253,225	259,185	260,700	263,400	259,900	259,100	—	260,400	260,375
Diluted Earnings Per Share (USD)	-3.14	-2.31	-0.46	1.04	8.09	4.51	10.29	9.01	12.82	—	10.18	13.32
Dividends Per Share (USD)	—	—	—	—	—	—	—	—	—	—	—	—

Valuation as of 31 Jan 2024

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Recent Qtr	TTM
Price/Sales	35.2	39.8	10.8	16.3	15.1	15.7	10.4	8.0	8.6	11.0	11.0	11.7
Price/Earnings	-53.8	-45.9	-82.0	196.1	66.2	26.5	23.1	26.3	22.8	30.6	30.6	32.6
Price/Cash Flow	-76.3	-64.1	149.3	49.3	36.2	39.7	19.4	26.8	18.4	24.2	24.2	25.8
Dividend Yield %	—	—	—	—	—	—	—	—	—	—	—	—
Price/Book	24.9	33.6	17.9	21.2	14.6	10.8	7.6	5.9	5.7	6.3	6.3	6.8
EV/EBITDA	0.0	-0.1	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Operating Performance / Profitability as of 30 Sep 2023

Fiscal Year, ends 31 Dec	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	YTD	TTM
ROA %	-31.7	-23.0	-4.2	8.2	42.8	16.2	27.0	18.6	21.0	—	—	18.1
ROE %	-60.8	-55.2	-10.7	16.5	64.9	22.4	36.7	24.9	27.7	—	—	23.5
ROIC %	-36.7	-27.6	-3.4	12.9	55.4	19.9	33.5	23.1	25.1	—	—	19.8
Asset Turnover	0.2	0.4	0.6	0.8	0.6	0.6	0.6	0.6	0.6	—	—	0.5

Financial Leverage

Fiscal Year, ends 31 Dec	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Recent Qtr	TTM
Debt/Capital %	42.4	44.0	31.1	22.4	11.6	9.3	9.3	8.1	5.5	—	4.3	—
Equity/Assets %	46.0	37.6	39.9	57.2	71.0	73.2	73.9	75.2	76.7	—	76.0	—
Total Debt/EBITDA	-1.4	-2.0	11.1	5.3	0.8	0.4	0.3	0.3	0.2	—	0.2	—
EBITDA/Interest Expense	-8.2	-4.9	0.9	1.7	10.3	26.7	56.4	47.4	80.9	Infinite	101.1	100.1

Morningstar Analyst Historical/Forecast Summary as of 08 Feb 2024

Financials

Fiscal Year, ends 31 Dec 2022	2021	2022	Estimates 2023	2024	2025
Revenue (USD Mil)	7,574	8,931	9,869	10,694	12,279
Revenue Growth %	22.1	17.9	10.5	8.4	14.8
EBITDA (USD Mil)	2,908	4,456	4,079	4,542	5,203
EBITDA Margin %	38.4	49.9	41.3	42.5	42.4
Operating Income (USD Mil)	2,782	4,307	3,832	4,274	4,896
Operating Margin %	36.7	48.2	38.8	40.0	39.9
Net Income (USD Mil)	3,384	3,855	3,968	4,049	4,630
Net Margin %	44.7	43.2	40.2	37.9	37.7
Diluted Shares Outstanding (Mil)	260	259	260	260	260
Diluted Earnings Per Share(USD)	13.02	14.88	15.24	15.55	17.78
Dividends Per Share(USD)	0.00	0.00	0.00	0.00	0.00

Forward Valuation

	2021	2022	Estimates 2023	2024	2025
Price/Sales	7.4	8.3	10.9	10.1	8.8
Price/Earnings	16.9	19.4	27.5	27.0	23.6
Price/Cash Flow	23.2	18.9	26.3	27.1	24.3
Dividend Yield %	—	—	—	—	—
Price/Book	5.7	5.4	6.2	5.2	4.3
EV/EBITDA	17.1	14.6	23.9	21.5	18.7

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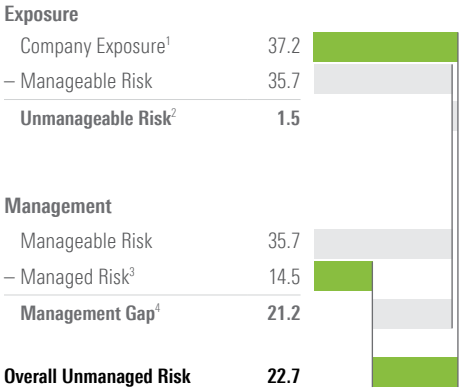
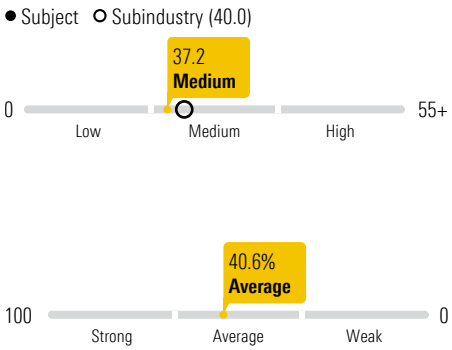
Vertex Pharmaceuticals Inc VRTX ★★ 8 Feb 2024 17:16, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
421.52 USD 8 Feb 2024	343.00 USD 8 Feb 2024 17:14, UTC	1.23	107.99 USD Bil 7 Feb 2024	Narrow	Large Growth	High	Standard	 7 Feb 2024 06:00, UTC

ESG Risk Rating Breakdown

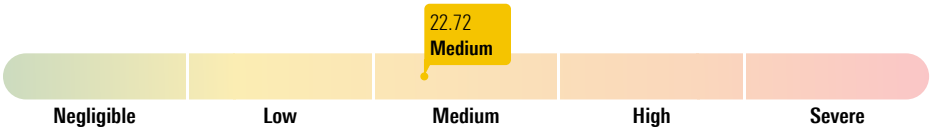




- Exposure represents a company's vulnerability to ESG risks driven by their business model
- Exposure is assessed at the Subindustry level and then specified at the company level
- Scoring ranges from 0-55+ with categories of low, medium, and high-risk exposure

- 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.

ESG Risk Rating Assessment[5]

ESG Risk Rating is of Jan 03, 2024. Highest Controversy Level is as of Jan 08, 2024. 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/.

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 40.6% 4. Management Gap assesses risks that are not managed, but are considered manageable 5. ESG Risk Rating Assessment = Overall Unmanaged Risk = Management Gap plus Unmanageable Risk

Peer Analysis 07 Feb 2024

Peers are selected from the company's Sustainalytics-defined Subindustry and are displayed based on the closest market cap values

Company Name	Exposure			Management			ESG Risk Rating		
Vertex Pharmaceuticals Inc	37.2 | Medium	0	55+	40.6 | Average	100	0	22.7 | Medium	0	40+
Biomarin Pharmaceutical Inc	37.0 | Medium	0	55+	36.2 | Average	100	0	24.1 | Medium	0	40+
Seagen Inc	38.3 | Medium	0	55+	30.4 | Average	100	0	27.1 | Medium	0	40+
Alnylam Pharmaceuticals Inc	42.0 | Medium	0	55+	33.7 | Average	100	0	28.4 | Medium	0	40+
Sarepta Therapeutics Inc	42.1 | Medium	0	55+	28.0 | Average	100	0	30.8 | High	0	40+

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Appendix

Historical Morningstar Rating

Vertex Pharmaceuticals Inc VRTX 8 Feb 2024 17:16, UTC

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
★★	★★★	★★	★★★	★★★	★★	★★★	★★★	★★★	★★★	★★★	★★★
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
★★★★	★★★★	★★★★	★★★	★★★	★★★	★★	★★	★★★	★★★	★★★	★★
Dec 2019	Nov 2019	Oct 2019	Sep 2019	Aug 2019	Jul 2019	Jun 2019	May 2019	Apr 2019	Mar 2019	Feb 2019	Jan 2019
★★	★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★

Alnylam Pharmaceuticals Inc ALNY 7 Feb 2024 22:21, UTC

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
★★★	★★★★	★★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★
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
★★★	★★★	★★★★	★★★	★★★	★★★	★★★	★★★	★★	★★★	★★★	★★
Dec 2019	Nov 2019	Oct 2019	Sep 2019	Aug 2019	Jul 2019	Jun 2019	May 2019	Apr 2019	Mar 2019	Feb 2019	Jan 2019
★★	★★	★★★	★★★	★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★

Biomarin Pharmaceutical Inc BMRN 7 Feb 2024 22:21, UTC

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
★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★
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
★★★★	★★★★	★★★★	★★★★	★★★★	★★★	★★★	★★★★	★★★★	★★★★★	★★★★	★★★★
Dec 2019	Nov 2019	Oct 2019	Sep 2019	Aug 2019	Jul 2019	Jun 2019	May 2019	Apr 2019	Mar 2019	Feb 2019	Jan 2019
★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★

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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, indepth 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 returns 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 derive 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.

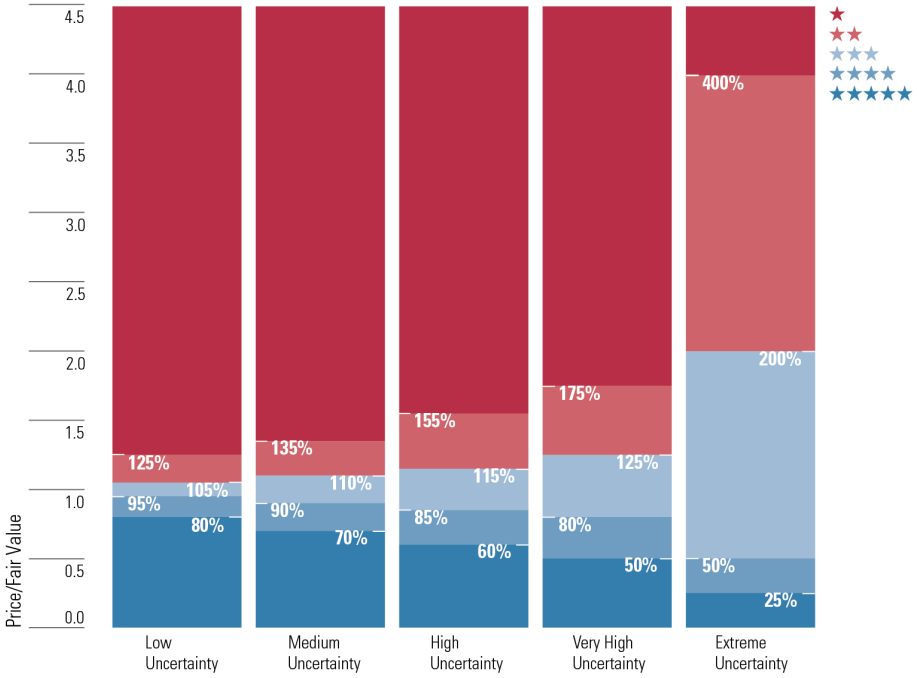
4. Market Price

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 adjusted 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 compan-

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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.

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.

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/

Ratings should not be used as the sole basis in evaluating a company or security. Ratings involve unknown risks and uncertainties which may cause our expectations not to occur or to differ significantly from what was expected and should not be considered an offer or solicitation to buy or sell a security.

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