promontory
investment research

Match Group
Nucor
Orion Engineered Carbons
Vertex Pharmaceuticals

Fall 2023 Equity Report

Foreword

Promontory Investment Research is proud to present its sixteenth equity research report in print. This autumn, our Research Analysts (RAs) produced stellar work in six industry pods. We've selected four of those reports to share with you: Match Group, an online dating service company; Nucor, a steel production corporation; Orion Engineered Carbons, a chemicals producer with a specialization in carbon black; and Vertex Pharmaceuticals, a biotechnology company and rational drug designer.

The thoroughness exhibited by our RAs this quarter is a testament to Promontory's goal of providing you with detailed and comprehensible research on equities. We witnessed firsthand a great deal of effort behind the creation of each report that is being presented to you. We could not be more proud of our RAs who are the foundation of our organization. Furthermore, this Autumn 2023 BFT class has displayed a tremendous level of development over the course of the quarter. We look forward to having New Recruits team up with current RAs to continue producing high-quality equity research in the winter.

While our interest in finance and equity research brings us together, the bonds we forge as NRs in BFT and RAs in industry pods keep us together. Since Promontory's conception, leadership has sought students who harbor a genuine interest in learning more about equity research, as well as down-to-earth people who have each other's backs. Therefore, Promontory is not merely a means to the end of gaining and spreading financial knowledge, but a community that's an end in itself. After all, somewhere in between studying for BFT quizzes, building DCFs, and losing our voices in a haunted house together, Promontory becomes the place where you can find a finance family that lasts throughout UChicago and beyond.

We're excited for all RAs—both old and new—to carry on these values. In the days, months, and years to come, we hope to share more reports that are accessible to anyone, whether you're a long-time investor or a soccer aficionado.

In the meantime, thank you for your interest, for your support, and for picking up our sixteenth publication. It's been a learning experience, a grand adventure, and a great honor.

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Match Group Inc (NASDAQ: MTCH)

Match Group Inc. | NASDAQ: MTCH	
Negative Neutral **Positive**	
Share price, 11/16/23:	$31.58
Market capitalization:	$8,002mm
Shares outstanding:	271.8mm
52-week range:	$54.60/$27.85
EPS (FY23):	$1.81
Beta:	1.89
Average analyst opinion:	$40.0
Price target:	$33.22

Price Chart

Financial Highlights

(Dollars in millions)	2022	2023E	2024E
Revenue	3188	3353	3648
% Growth	*6.89%*	*5.15%*	*8.80%*
EBIT	515	774	860
% Revenut	*16.15%*	*23.10%*	*23.6%*
PV FCF		889	688

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Investment Overview

Match Group, Inc. ("Match") owns a portfolio of digital dating platforms, most notably Tinder and Hinge. In the past year, Match has faced considerable foreign exchange headwinds, which have impacted their top line. A series of management shake-ups have also adversely affected their product performance and execution. However, we believe present uncertainty about Match Group's financial performance caused by undue investor skepticism presents a unique opportunity to invest, and with a price target of $33.22, we recommend a buy of MTCH.

Company Overview

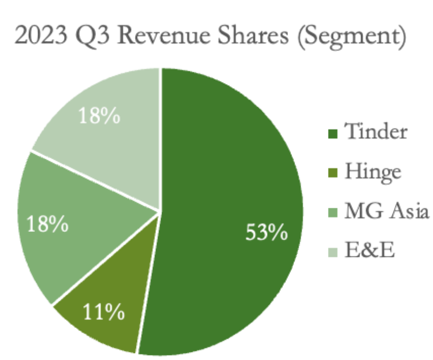
Match Group, Inc. ("Match") is a digital technologies company that operates the world's largest portfolio of online and mobile dating services, including Tinder, Hinge, and Match.com. It operates a global portfolio with platforms offered in the Americas, Asia, Europe, and the Pacific.

Business Segmentations

Match is segmented into four key business areas: Tinder, Hinge, Match Asia, and Evergreen & Emerging. All business segments follow the same general business model (detailed below) but differentiate themselves by specializing in certain relationship dynamics or targeting specific demographics or dating markets.

Tinder

Tinder is the largest business area by monthly active users and subscribers and, as a result, has historically driven the Match Group's financial performance and business strategy. According to Match, 55% of all dating app users have "been in a serious relationship with someone they met on Tinder." Tinder subscriptions accounted for 57.33% and 57.58% of the Match Group's revenue in 2022 and the first two quarters of 2023, respectively. Since 2018, Match has seen a 22% CAGR with respect to Tinder's total annual revenue, largely in part due to its rapidly increasing subscriber base since Tinder was first monetized in 2015. But while steadily increasing average revenue per user (ARPU) caused by a wider spread and consumption of premium subscription packages has helped Tinder's revenue continue to grow, its struggle to retain subscribers has led to the declining growth in the number of paying users (+37.11% in 2018 to +10.78% in 2021) and total revenue growth since 2018 (+43.11% in 2018 to +8.72% in 2021), a concern acknowledged by the former CFO of Tinder in September 2023.



Hinge
Hinge is the fastest growing business area by monthly average users and subscribers largely due to its popularity among younger users (age 18-29) and virality on social media platforms like Instagram and TikTok. Hinge has approximately 15 million daily active users, of which almost 1.2 million are subscribers. Hinge subscriptions accounted for 9.06% and 10.88% of the Match Group's revenue in 2022 and the first two quarters of 2023, respectively. Since its acquisition in 2018, Hinge has had a CAGR of more than 78% and has seen massive success among young users due to it catering to their unique perspectives on the dating market. Unlike its much larger and older sister, however, Hinge has rapidly and consistently grown its paid user base and ARPU since 2018. Indeed, the high proportion of Hinge users (87%) looking for a relationship may suggest a higher willingness to pay for the platform's premium features and explain why Hinge's ARPU is about 66% higher than that of Tinder's ($15 ARPU vs $25 ARPU).

Match Group Asia (MG Asia)
Match Group Asia consists of three subsidiary companies: Pairs, Azar, and Hakuna Live. By 2022 downloads, Pairs is the second-most popular dating app in Japan, trailing only Tinder. Acquired in 2021, the South Korean company Hyperconnect and its two subsidiaries, Azar and Hakuna, expanded the Match Group's share of the Asian networking market. Match Group Asia accounted for 10.28% and 9.57% of the Match Group's revenue in 2022 and the first two quarters of 2023, respectively. MG Asia has seen underwhelming success, primarily with their Azar and Hakuna Live platforms in the larger Asia market, and, as a result, has seen its revenue decline by 4% from 2022 Q2 to 2023 Q2.

Evergreen and Emerging
Evergreen and Emerging is the Match Group's portfolio of legacy and developing online dating services. Legacy platforms, referred to as "Evergreen" by Match, include some of the Match Group's oldest platforms like Match.com, OkCupid, and Plenty of Fish. While they tend to cater to similar geographic markets as Tinder and Hinge, they cater to different demographics, namely according to age: the average Tinder and Hinge user is around 25 years old, while the average Plenty of Fish user is 28, and Match.com user is 36. Due to the target demographic and the nature of the demographic's relationship preferences, these platforms tend to have fewer overall users and subscribers. Developing platforms, referred to as "Emerging" by Match, include Match's portfolio companies that cater specifically to target demographics, namely according to race and sexuality, like Chispa (for Latino and Latina singles), BLK (for black singles), and Archer (for gay, bisexual, and queer men). The League, the exception in this category, is a paid dating app that requires profile approval to join. Together, Evergreen and Emerging companies accounted for 23.33% and 21.96% of the Match Group's revenue in 2022 and the first two quarters of 2023, respectively. Like MG Asia, the declining popularity of Evergreen and the underwhelming success of Emerging brands have resulted in a loss in revenue for the business area, declining by 5% from 2022 Q2 to 2023 Q2.

Business Model
Except for The League, all of the Match Group's portfolio companies operate on a freemium, subscription-based model in which users pay for additional access or advantages in the dating platform. Most of Match's companies operate on similar two- or three-tiered subscription models, which offer subscribers unlimited likes or swipes, messaging other users, boosts (a feature that helps a user's profile receive more views), and super likes (a feature that helps a user increase their chances of being recommended to another user). Specific features, subscription tiers, terms, and pricing, however, differ by platform.

Two of the Match Group's most successful business segments, Tinder and Match, offer premium subscriptions starting at $8/month and $30/month, respectively. Apps aimed at users with specific dating preferences (i.e., relationship dynamic, racial group, etc.) tend to have higher price points, with The League, the Match Group's most selective dating platform, charging users up to $99 per week. Match also offers its loyal users "extra-premium" subscriptions, recently announcing "Tinder Select" in mid-2023: a premium subscription for the top 1% of Tinder users offering special and early access at $499/month. Premium features cater to users dedicated to finding a partner on the Match Group's platforms, with online forums and word-of-mouth speaking to the value of premium subscriptions potentially speaking to the value of the purchase. Pricing for subscriptions varies for users according to region (i.e., Asia, Europe, North America, etc.), location type (urban, suburb, etc.), availability of potential matches, and so on. Age was formerly a factor considered in the Match Group's pricing model but was removed in 2022 following a lawsuit alleging unfair price discrimination practices.

Strategic Initiatives
Since the transition to the Match Group's new management team led by Bernard Kim in 2022, Match has set its sights on optimizing its pricing strategy across its most popular platforms in different regions to maximize ARPU. In 2023 Q2, the Match Group attributed much of its continued momentum in revenue growth and ARPU to price and package optimizations for US Tinder users, noting 6% YoY revenue growth at 10% YoY revenue per payer (RPP) growth. Management has also shown a greater openness to experimentation to optimize product pricing, determining price increases for Asian, Canadian, and European users to be largely optimized after experimentation over the second quarter. Match plans to continue this model into 2023 Q3 and Q4 in an attempt to find a level of mature optimization for US users like that of users in Asia, Canada, and Europe.

For the past several years, the Match Group has assessed the demographics and trends in its user base to increase the appeal of its products to current and prospective users through Tinder's "Year in Swipe" and "Future of Dating" reports. The Match Group has observed some consistent trends since 2019 and 2020, leading to changes across many of its major portfolio companies. Feedback from users indicating the importance of authenticity led to Tinder, along with several other platforms like Plenty of Fish and OkCupid, adding conversation starter prompts and relationship preference option features. While the Match Group primarily assesses shifts in the online dating market scene leveraging Tinder user data and preferences, it also considers popular changes across all its platforms, namely its fastest-growing platform Hinge–given its popularity among young millennials and Generation Z users.

Company Management
The Match Group, especially Tinder, has a long history of poor management, which has, in turn, adversely affected public and market sentiment toward the company. Since 2017, when the Match Group completed its acquisition of Tinder, the platform has had eight different CEOs, some serving for less than 1 year, and many other management complications, including several sexual harassment allegations (one of which led to the founding of Bumble). Bernard Kim, who formerly served on the

Match Group's board of directors, has served as the CEO of the Match Group and Tinder, being the longest-serving CEO of Tinder since 2017. The Match Group has performed well under Kim, his management team, and his shift toward pricing optimization and demographic customization for the Match Group's platforms.

Mergers and Acquisitions

Match's greatest successes and failures have originated almost exclusively from its mergers and acquisitions over the past decade. After forming from IAC in February 2009, the Match Group acquired People Media in July of that year–a company managing nearly 30 different dating sites and 250,000 paid users. Two years later in 2011, Match acquired OkCupid, a dating platform that, at the time, offered its features largely for free. While the platform offered an "A-Tier" for users willing to pay for additional features, the Match Group has gradually monetized OkCupid with little significant impact on their bottom line.

Tinder, a mobile app developed by a team working in a startup incubator owned by IAC, was informally and partially merged into the Match Group's portfolio in 2012 after IAC purchased a considerable share of Tinder for $50 million. In 2017, Tinder began to monetize rapidly, releasing Tinder Gold and Tinder Plus in 2015 at $4.99/month and $14.99/month, respectively. The platform's subscription model found massive success among "horndogs who don't mind being single forever" (GQ 2017), making Tinder alone the highest-grossing non-gaming app in the world at the time with a more than $1 billion valuation. Later that year, Match failed to acquire Bumble–another dating platform founded by Tinder co-founder Wolfe Herd in 2014–for $450 million.

In 2018, the Match Group acquired a majority stake in Hinge, a dating app "designed to be deleted" dubbed the "anti-Tinder," in an attempt to diversify its portfolio and move away from the heavy social stigma carried by Tinder. After the initial investment, Hinge saw a threefold increase in its user base from 2.4 million at the end of 2017 to 8 million at the end of 2019. By the end of the year, Match had fully acquired Hinge.

From 2019 through 2022, the Match Group continued to acquire small and niche online dating services to expand the breadth and depth of its market share of the global online dating and social connection markets. Platforms include such as Harmonica, an Egyptian dating start-up, in 2019, Hyperconnect, a Korean social networking company, in 2021 (its largest acquisition since 2009), and The League, an exclusive online dating service, in 2022. According to a market sizing estimate by Apptopia in 2021, the Match Group, through its portfolio of companies, owned almost 60% of the online dating market.

Industry Overview

The online dating service industry comprises companies that offer romantic relationship services through the Internet. It is distinct from social networking sites that seek to encompass the entirety of social interactions rather than focusing on romantic relationships. According to Grand View Research, the global online dating market is valued at "USD 9.65 billion in 2022 and is projected to register a compound annual growth rate (CAGR) of 7.4% from 2023 to 2030."

Industry Trends and Growth Drivers

The increasing consumer segment aged 18 to 29, which generates the largest proportion of revenue in the industry, has contributed to several key effects on how dating services have been structured. The first is the rise of online dating services (BLK - for Black people, AsianDating - for Asian people, Jack'd - for gay people**)** that target specific ethnic, religious, and age-based groups. The second is the shift towards smartphones as the main method of accessing online dating apps with mobile dating apps making up over 60% of the industry's revenue.

The consumer segment aged 30 to 49 years old is the most likely to use online dating services to find long-term and lasting relationships. As a result of demographics, consumers in this age category are more willing to pay for better matches and speed (as time-poor consumers). This has contributed to a decreasing interest in single-event or matchmaking services due to the speed of online dating services. During the pandemic,
dating platforms used AI and machine learning to expedite the matching of client preferences with video-based speed dating and profiles to increase interactivity to create a more bespoke service for consumers.

Finally, though often ignored by existing sell-side research, there exists an increasingly large pool of older consumers (50 and up) looking for relationships through online dating services. Often widowers or divorcees, this category of consumers is increasing, especially as consumers in this age category are able and willing to pay for better matches. Services in this category include SeniorMatch, eHarmony, and Singles 50.

Competitive Landscape

The global dating industry is highly competitive, with around 2,000 online dating sites. The largest providers include the Match Group (largest in occupying 25% market share), EHarmony (just under 12% market share), and Bumble Inc (composed of Bumble and Badoo). Specifically, regarding the platforms, Tinder, Bumble, Badoo, Hinge, and Tantan occupy the highest five market shares in online dating apps.

<u>Comparable Advantage</u>

Match Group is the leading player in the industry. Regarding competition by geography, Tinder ranks top among many countries regarding user engagement, with BLK Dating, Hinge and OkCupid amongst the top 10. In the U.S. specifically, Tinder occupies the largest user shares, followed by Plenty of Fish, OkCupid, and Hinge, allowing Match Group to have four platforms ranking in the top 10. Its diverse portfolio of platforms enables it to capture various niche audiences, including Match.com for older generations who prefer websites over apps, Hinge for users seeking more serious relationships, and Plenty of Fish, whose users are more non-committal.

The successes also feed into the network effects and economies of scale that Match Group can achieve. Online dating services rely on the number of users to connect and match users. For Match Group, if users don't find someone interesting on one of its platforms, its advertisement and algorithm could prompt users to switch to other platforms under its portfolio, which outcompete most of the other competitors with a much smaller portfolio. Regarding exclusivity, Tinder has the highest 86.7% exclusivity rate, meaning only 13.3% of the platform's users utilize other sites, while Bumble only has a 53% exclusivity rate. Thus, Match Group's portfolio contains many successful online dating platforms, including Tinder, OkCupid, and Hinge, in terms of user activeness, most downloaded, and highest exclusivity.

Key risks

Since Match Group operates in both generic and niche online dating platforms, it has risks corresponding to the type of platform. For generic platforms like Tinder, any type of person can use it and the value comes from attracting enough members to match the two sides, and the more active members, the more potential matches for everyone. The risk comes from the overall perception of the platforms as it influences which platforms users choose. Moreover, as many platforms of Match Group use a freemium business model, for those who don't want to pay for service options but hope to increase their success rate, it leads to people using multiple competitors' products simultaneously to increase their chances, decreasing revenue and increasing competition.

Another risk comes from niche platforms, which focus on compatibility instead of aiming for more users. Compared to competitors such as Dating Ring, which has a smaller but more focused user base and uses a human curator to do matches, Match Group needs to differentiate in its ability to attract specific groups of people.

Lastly, the industry faces the churn dilemma, where if they are doing a good job at getting people in a relationship, then lose their members as the users will unlikely need the dating service once the platform succeeds in finding them a partner.

Investment Thesis

Thesis 1 - Considerable and continued growth in US Markets despite short-term setbacks

In a comparison of dating apps Tinder, Bumble, and Hinge, Hinge's growth has been staggering, despite having the lowest market share. Over the last three years, Hinge's MAU has grown nearly 350% in comparison to Bumble's more modest 100% and Tinder's -1%. This growth is due to Hinge's hold on young consumer demographics through its product development focused on customization-enfranchising personality and humor-based profiles over only attractiveness.

As Gen Z increasingly prioritizes common interests, "descriptions" (essentially, who you are), and of course, your appearance, Hinge's product built intentionally to draw comparisons to Instagram and TikTok will not only boast a familiar UI but also one that feels comparatively less transactional and more genuine than other dating apps. As younger consumers increasingly turn towards dating apps (as a primary driver of industry revenue), Hinge is well-positioned to grow and take market share from current giants. In Q2, Hinge's direct revenue grew 35% Y/Y, with a 24% YoY increase in payers to 1.2 million. Hinge continued to grow in English-speaking markets, as well as in its European expansion markets, leading to overall downloads growing nearly 50% YoY in Q2. Hinge is now one of the top three most downloaded dating apps in 14 markets globally.

Thesis 2 - Pricing optimization and remodeling yield higher ARPU

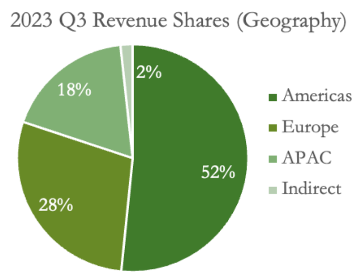
Since Q1 of 2023, Match Group introduced new U.S. pricing optimizations, which include increased pricing as well as introducing weekly subscription packages. Although official reports did not reveal the exact price increase, which is likely caused by Tinder's unrevealed pricing algorithm based on individuals' demographics, an example price users have reported showed that Tinder+ increased to $11.99 per week from $14.99 per month, Tinder Gold increased to $16.99 per week from $24.99 per month and Platinum increased to $22.99 per week from $29.99 per month (statistic from users' post on Reddit, for third-party statistics see table below). As a result, in Q2, Tinder's direct revenue reached $475 million, with a growth of 6% Y/Y, and RPP rose 10% Y/Y to $21.53. Specifically, Match Group credited weekly subscription packages introduced to the U.S. in Q1 that expanded to European countries in Q2 as the revenue driver due to increasing demand from new users for shorter-duration packages, which also prompted conversion and resubscription rates for female users, especially younger female users.

	Length	2022	2023	% Change
Plus	**1 month**	7.99	13.49	68.84%
	6 months	4.00	6.75	68.75%
	12 months	2.67	4.50	68.54%
Gold	**1 month**	24.99	22.49	-10.00%
	6 months	12.50	11.25	-10.00%
	12 months	8.33	7.50	-9.96%
Platinum	**1 month**	29.99	26.99	-10.00%
	6 months	15.00	13.50	-10.00%
	12 months	10.00	9.00	-10.00%

Nonetheless, the increase in tiered price led to decreased payer conversion of 4% Y/Y to 10.5 million, and Tinder responded with its priority of maximizing revenue to achieve higher overall revenue even with the sacrifice of lower payer growth. Consequently, seeing an acceleration of subscription revenue growth in the U.S. market in Q2 2023, Match Group will implement weekly subscription packages globally across other markets. Moreover, Tinder has also announced a new ultra-premium tier (~$500/month), which requires a screening test and allows subscribers to message people they've not already matched with for the first time.

Thesis 3 - Diversifying regional revenue streams hedge against bear concerns for online dating market saturation

Since 2019, almost 50% of the Match Group's revenue has come from outside the US and Canada. In 2022, 48.91% of total revenue came from European and APAC users, most of which were active on platforms like Tinder and Hinge. APAC and other direct revenue grew 11% relative to 8% growth in Americas direct revenue and 3% growth in Europe direct revenue. Strong growth in APAC paid users (19%) relative to that in the Americas (2%) and Europe (2%) drove performance in the region, with continued expansions of Tinder into South and East Asian markets.



Hakuna Live and Azar, two social connection platforms acquired in 2021, have not yet reported significant financial results since the acquisition, largely due to the weakness of the Yen and Won. But with more than 75% of user activity and revenue on both platforms originating from APAC users, the platforms hold long-term promise for the Match Group's penetration in the region. Recent developments like a new AI-powered matching algorithm on Azar and a renewed focus on content creators and users on Hakuna Live enable positive revenue momentum for 2023 Q3 and Q4, moving Match away from its historic double-digit revenue decline in the region. Additionally, the popularity of live streaming and the rise of "friendship apps" in the East Asia markets promise tailwinds for user acquisition for Hakuna Live.

Other analysts fail to recognize the accelerating success of Hinge, which we believe will drive the Match Group's diversification strategy for the next 3 to 5 years; Hinge's widespread success in the US and Canada already leads a larger internal movement to diversify and solidify revenue streams across regions. Match is aiming to reinvigorate growth in Europe (3% revenue growth, 2% paid user growth, and 1% RPP growth) by targeting similar dating cultures in Western European countries where Hinge already has a presence, like the United Kingdom, France, and Germany. Marketing and social media virality in 2023 Q1 and have seen massive YoY download growth (upward of 50%), paid user growth (~10%) , and ARPU growth (~20%) across US and European users from 2021 to 2022, and we expect an increasing focus on the localization and culturalization of the platform's features to carry Hinge's momentum beyond the Americas region in 2023 and 2024.

Investment Risks

Risk #1

While both Tinder and Hinge seem poised for future growth or recapture of previously lost consumers, this is shadowed by the increasing oversaturation and limited market of potential new users in the United States and competition from home-grown competitors in foreign markets seeking to occupy market share for Tinder.

On Hinge's side, though rapid growth and dominance of Gen Z demographics is good for the app itself, the potential cannibalization and reduction of market share of Tinder in the United States is counterproductive overall for the Match group. If Hinge is unable to enfranchise and monetize new users as opposed to existing users in the dating market, cannibalization will likely reduce overall value rather than increase it.

Mitigating Factor #1

Global growth factors are on pace to outgrow current projections of market share cannibalization, primarily in foreign markets. For US markets, Tinder's market share has kept relatively constant over the past two years (with growth during the pandemic). Hinge's increasing market share will offset Tinder's loss in the US market even as Tinder captures new users worldwide.

Risk #2

Tinder's pricing optimization and shorter subscription may be a negative move as there would be fewer users paying in addition to paying for shorter periods of subscription that may not be able to generate longer-term revenue due to its churn dilemma.

Mitigating Factor #2

Tinder's direct revenue for Q2 and Q3 of 2023 has held up despite the payer drop, which could show its payers accept higher prices. Additionally, we are bullish on behavioral patterns of former payers of Match Group products, anticipating payer growth to change from positive to negative once price optimization wanes in 2024. Price optimization has also attracted more female users to the platform by offering lower subscription prices to previously paying female users, allowing Match to maintain the ecosystems of its products despite this short-term setback.

Valuation

Assumptions

Revenue projection is based on geography, where there is expected higher growth in Asia and Europe and slower growth in North America due to saturation. The operating expenses are projected to have increasing advertising and product expenses to account for the future plans mentioned by The Match Group as mentioned in their Q3 earnings report. The Match Group has had a lower than statutory tax rate due to a reversal of valuation allowances through using the deferred tax assets, favorable outcomes of tax audits, and a lower tax rate on U.S. income derived from foreign sources.

Match Group: MTCH

n thousands **VALUATION**

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Revenue	2,051,258	2,391,269	2,983,277	3,188,843	3,353,212	3,648,224	3,990,743	4,379,049	4,811,144
% growth		*16.58%*	*24.76%*	*6.89%*	*5.15%*	*8.80%*	*9.39%*	*9.73%*	*9.87%*
EBIT	652,100	745,700	851,700	515,000	961,630	1,063,311	1,148,272	1,307,590	1,438,806
% revenue	*31.79%*	*31.18%*	*28.55%*	*16.15%*	*28.68%*	*29.15%*	*28.77%*	*29.86%*	*29.91%*
Effective Tax Rate	*3%*	*7%*	*-8%*	*4.00%*	*4.00%*	*21%*	*21%*	*21%*	*21%*
NOPAT	632,537	693,501	917,858	494,400	923,165	840,016	907,135	1,032,996	1,136,657
D&A	34,355	41,271	41,402	43,594	46,945	51,075	55,870	61,307	67,356
% revenue	*1.67%*	*1.73%*	*1.39%*	*1.37%*	*1.40%*	*1.40%*	*1.40%*	*1.40%*	*1.40%*
CapEx	-39,000	-42,400	-80,000	-49,100	-53,651	-58,372	-63,852	-70,065	-76,978
% revenue	*-1.90%*	*-1.77%*	*-2.68%*	*-1.54%*	*-1.60%*	*-1.60%*	*-1.60%*	*-1.60%*	*-1.60%*
NWC	-206,975	-218,988	-677,318	-255,087	-277,788	-290,498	-307,150	-345,377	-367,055
∆NWC		-12,013	-458,330	422,231	-22,701	-12,710	-16,652	-38,227	-21,678
FCF		680,359	420,930	911,125	893,758	820,009	882,501	986,011	1,105,357
Discounted Factor					1.11	1.23	1.37	1.52	1.69
Present Value FCFF					**$804,465**	**$664,345**	**$643,543**	**$647,189**	**$653,040**

WACC Calculations	
Current Stock Price	$29.44
Shares Outstanding	271,810
Market Capitalization	8,002,086
Total Debt	3,835,700
Net Debt	3,263,300
E / (E+D)	71%
D / (E+D)	34%
Risk Free Rate (10T)	4.57%
Beta	1.89
Market Risk Premium	4.39%
Cost of Equity	12.86%
Cost of Debt	7.30%
Tax Rate	21.00%
WACC	**11.10%**

GGM	
Terminal Growth Rate	3.00%
Terminal Value	14,056,430
Present Value of Terminal Cash Fl	8,304,474
Sum of PV of Near-Term Cash Flov	3,412,582
Implied Enterprise Value of Firm	**11,717,056**
Implied Equity Value	8,453,756
Implied Price Per Share	**$31.10**
Implied Premium	5.64%

Exit Multiple	
EV/EBITDA Exit Multiple	11.51
Terminal Year EBITDA	1,506,162
Terminal Value	17,335,930
Present Value of Terminal Cash Fl	10,241,988
Implied Enterprise Value of Firm	**13,654,570**
Implied Equity Value	10,391,270
Implied Price Per Share	**$38.23**
Implied Premium	29.86%

Peers Company	Unlevered beta
Bumble Inc	1.38
Meta Platforms Inc.	1.76
Airbnb	1.90
eBay	0.94
Netflix	1.15
Yelp	1.34
ETSY	1.12
Average Unlevered Beta	1.37
MTCH Levered Beta	**1.89**

Sensitivity Table: Wacc vs. Exit Multiple

29.86%	10.10%	10.60%	11.10%	11.60%	12.10%
10.51	25.28%	21.96%	18.73%	15.59%	12.52%
11.01	31.10%	27.65%	24.29%	21.02%	17.84%
11.51	36.91%	33.34%	29.85%	26.46%	23.15%
12.01	42.73%	39.02%	35.41%	31.90%	28.47%
12.51	48.55%	44.71%	40.97%	37.33%	33.79%

Sensitivity Table: Wacc vs. GGM Terminal Growth Rate

5.64%	10.10%	10.60%	11.10%	11.60%	12.10%
2.50%	18.16%	8.05%	-0.87%	-8.81%	-15.91%
2.75%	22.36%	11.68%	2.29%	-6.04%	-13.48%
3.00%	26.87%	15.55%	5.64%	-3.12%	-10.91%
3.25%	31.70%	19.68%	9.20%	-0.02%	-8.19%
3.50%	36.90%	24.10%	13.00%	3.27%	-5.32%

Company:	Revenue	Market Cap	Net Income	EV/Revenue	Gross Margin	Operating Margin	EV/EBITDA	EV/EBIT
Meta Platforms	116,609,000,000	315,555,188,424	23,200,000,000	2.45	79.60%	28.80%	6.76	8.51
Airbnb	8,399,000,000	54,923,249,147	1,893,000,000	5.63	69.80%	22.50%	23.88	25.01
eBay	9,795,000,000	22,504,072,338	2,312,000,000	2.44	72.60%	27.40%	7.64	8.93
Netflix	31,615,550,000	131,227,643,271	4,491,692,000	4.41	39.40%	17.80%	6.98	24.77
Yelp	1,193,506,000	1,905,661,128	36,347,000	1.28	87.40%	5.80%	11.51	22.17
Bumble	903,503,000	4,264,982,705.25	-79,746,000	5.88	62.50%	8.50%	31.99	69.57
ETSY	2,566,111,000	15,054,946,490	-694,288,000	6.34	71.00%	15.10%	33.67	42.11
Match Group	3,188,843,000	11,588,410,338	368,086,000	4.65	57.10%	16.20%	16.05	28.82

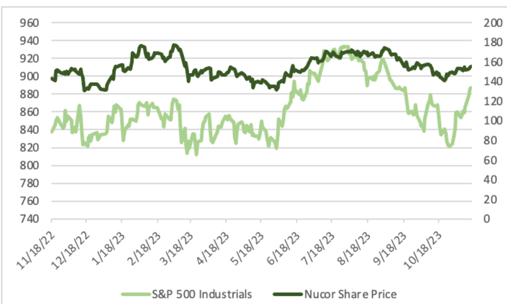
	EV/Revenue	EV/EBITDA	EV/EBIT
Median	4.41	11.51	24.77
Average	4.06	17.49	28.72
25 Percentile	2.45	7.31	15.55
75 Percentile	5.76	27.94	33.56

Implied Share Price	
Median EV/EBITDA	11.51
Implied EV	10,645,092,560
Implied Equity Value	7,390,492,560
Implied Share Price	27.19
Upside	-7.64%

Nucor (NYSE: NUE)

Nucor Corporation | NYSE: NUE	
Negative Neutral	**Positive**
Share price, 11/18/23:	$156.76
Market capitalization:	$38,540mm
Shares outstanding:	451.5mm
52-week range:	$182.68/$129.5
EPS (3Q23):	$4.57
Beta:	1.27
Average analyst opinion:	$150.0
Price target:	$168.0

Price Chart



Financial Highlights

(Dollars in millions)	2022	2023E	2024E
Revenue	41511	31251	30755
% Growth	*13.78%*	*-24.72%*	*-1.59%*
EBIT	10409	3151	2890
% Change	*12.12%*	*-69.41%*	*-5.41%*
EBIT (%) of Rev	25.07%	10.08%	9.4%

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Investment Overview

Given the company's differentiated operational efficiency and technology use, we believe Nucor has the ability to weather through a forecast drop in steel prices and take advantage of the tailwinds in the steel industry to increase their market share.

Company Overview

Company History

Nucor Corporation's history began in 1955 when dissident shareholders of REO Motor Car Company challenged the company's liquidation, leading to a reverse takeover of Nuclear Consultants, Inc. This move renamed the company Nuclear Corporation of America Inc., which initially tried to specialize in nuclear services. However, after unsuccessful ventures and a bankruptcy in 1965, the company, under F. Kenneth Iverson's leadership, focused on its profitable steel fabrication division, Vulcraft. Nucor, then based in Charlotte, North Carolina, expanded into steelmaking in 1968 with its first steel bar mill in Darlington, South Carolina. By 1972, after significant growth and a change to its core business, the company was renamed Nucor Corporation and went public. Since then, Nucor's early entry into Electric Arc Furnaces and quick adaptation to a rapidly evolving American steel industry has led to its success, with Nucor being the largest steel producer in the United States and the largest recycler of scrap in North America.

Raw Materials

Nucor's Raw Materials division, contributing 4.2% to 4.7% of EBIT in recent years, focuses on enhancing vertical integration in the company's operations. This segment includes natural gas interests, primarily wells in Colorado's Piceance Basin, for internal use. It also encompasses the production of Direct Reduced Iron (DRI), the brokerage of metals, pig iron, Hot Briquetted Iron (HBI), ferro-alloys, and most importantly, scrap metal processing. This strategic diversification secures key inputs, supporting Nucor's steel making capabilities. Approximately 80-90% of these inputs (depending on the market climate) are used by Nucor in its steel mills & steel products segment functions, with the remainder being sold to third parties typically at spot prices.

Steel Mills

The Steel Mills segment, a cornerstone of Nucor's operations, constituted 61% of EBIT in 2022 and 84.1% in 2021. It encompasses various mill types including 6 sheet steel mills producing for multiple industries, 15 bar mills with a capacity nearing 10 million tons/year, 2 structural mills for heavy steel products, and a unique 51%-owned Nucor-Yamato mill for seismic projects. Additionally, Nucor operates 3 plate mills with a capacity of 2.925 million tons/year. An industry-forward approach is demonstrated in their collaboration with NuScale for co-locating small modular reactor power plants at Nucor facilities, addressing the significant electricity costs in steel production.

Steel Products

The Steel Products division, accounting for 11.15% of EBIT in 2021 and a notable increase to 34.7% in 2022, includes various groups working both independently and in tandem within the steel industry. The mills and fabrication sites of these groups are often positioned within close proximity of the relevant Nucor mills that the groups source their inputs from to streamline production and cut logistical costs. Key components of this division are the Vulcraft/Verco Group, leading in open-web steel joists and decking, the Nucor Tubular Products Group with 8 mills, and units specializing in rebar fabrication, cold finish, and steel mesh and fasteners. This division's strategic positioning and acquisitions under the "Expand Beyond" strategy have made Nucor the 15th largest steel producer by tonnage in 2022, highlighting its importance in the broader steel industry. They have also made Nucor a leading player in many key specialty steel products, most notably rebar, lightweight automotive frames, and steel mesh.

Revenue & Cost Structure

Nucor Corporation's revenue and cost structure reflect its strategic business approach. On the revenue side, most raw materials are sold at spot prices, offering flexibility but limited long-term stability. Steel mills primarily operate under 1-year fixed contracts, providing some protection against short-term market volatility. The steel products segment varies, with sales either on a project contract basis or 1-year fixed contracts, depending on the group. Cost-wise, Nucor benefits from a high degree of vertical integration, particularly in ferrous scrap/materials, leading to reduced supply chain variability. A significant cost factor is electricity, for which Nucor is seeking solutions such as co-located small modular nuclear reactors. Labor costs, typically a concern in this industry, are managed efficiently through a non-unionized workforce with performance-based bonuses and a culture against layoffs, resulting in low labor turnover. This unique approach to labor management not only controls costs but also fosters employee loyalty and stability, and will enable them to retain talent in the event of depressed revenue.

Industry Overview

The steel industry lies at the core of the global industrial system with an estimated 1.9 billion metric tons produced in 2022. The steel market is oligarchic, with a handful of the North American producers that fill **most** of US demand and a few dozen major producers globally. There are high barriers to entry due to high capital investment, economies of scale in production, as well as regulatory barriers. Though each firm focuses on specific steel products, there is considerable global competition in the steel industry. There are meaningful, but not overbearing transportation costs for foreign producers – with the main hurdle for global competition being the usage of steel tariffs. Steel is a commodity good, though there are meaningful differences in quality that do affect price. For example, Asian steel prices are about $200 per ton less than US and European steel prices. An oversupply of Asian steel will significantly depress steel prices over the next five to ten years, but Nucor's uniquely lean capital structure will allow it to maintain better margins than the industry group as a whole. Nucor's primary US competitors include Steel Dynamics, US Steel, and Cleveland-Cliffs.

Figure 2 – U.S. Imports of Steel Mill Products by Partner - YTD Jun 2023

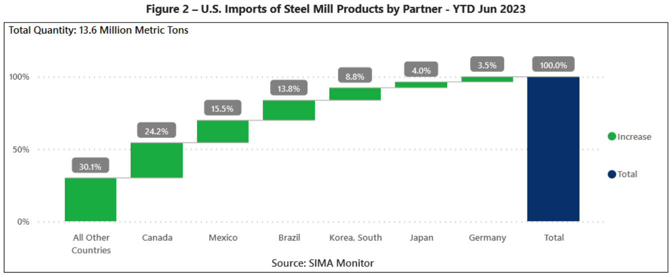
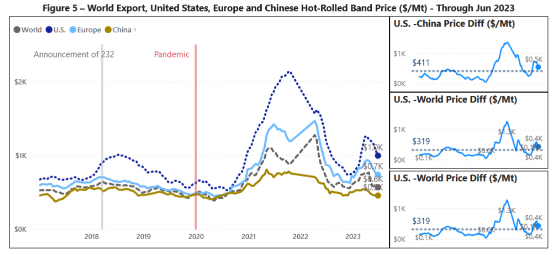


Figure 5 – World Export, United States, Europe and Chinese Hot-Rolled Band Price ($/Mt) - Through Jun 2023



Production Trends

In the US and Eurozone steel industry, a shift has been made to utilize electric arc furnaces (EAFs) instead of carbon intensive blast furnaces. EAFs benefit from machinery that often demands lesser effort and provides a more adaptable production capacity. Instead of relying on mined iron ore or coking coal, these operations utilize scrap steel, enabling them to adapt more swiftly to market needs. At present, about 70% of the steel manufactured in the U.S. comes from EAFs. Their cost-efficient nature suggests that this portion is set to increase. However, a potential challenge lies in the potential shortage of scrap steel. As production surges, companies might struggle to source enough scrap. Nucor's unique level and depth of vertical integration, however, should allow it to weather this threat relatively well.

Another move towards advanced AI and technology usage among US steel manufacturers is in its infancy as well. Data management, cybersecurity, and AI are all pieces of improving operational efficiency and protecting US steel producers from possible threats. For example, cameras with computer vision which can help ensure safety protocols are followed by steel workers. Steel producers have been shifting production towards lighter, specialized, high-value steel products lately, driven by forces such as rivalry from other materials in the car-making industry and a need for different types of steel rebar fabrication. Specialty steel is expected to maintain its significance in vehicle manufacturing due to its inherent benefits – which is especially important because of the increasing move to aluminum usage in automotive. To set themselves apart, we project that American steel producers will focus on promoting these high-value steel varieties over the traditional carbon steel, increasing market share for steel makers with the requisite capacity, expertise, and operational flexibility required to take advantage of these tailwinds.

Industry Tailwinds

Steel prices have slumped compared to their 2022 highs due to a myriad of factors both domestic and international. China's Covid recovery – specifically its construction industry's current property crisis – has slowed domestic consumption and increased its own exports of steel. A pessimistic macroeconomic environment stateside has also cooled North American construction, and by extension, steel demand. Due to the high capital intensity of the industry, drops in demand can place an outsized downward pressure on margins and earnings of major steel players. Particularly, steel making in a blast furnace requires a minimum flow of inputs, which makes reducing production costly compared to other industries in the sector. Steel makers, like Nucor, whose production capacity relies on alternative technologies to make production efficiently scalable will suffer less wastage during drops in demand. Optimistically, as of June 2023, the US government reports that capacity utilization of US steel manufacturers remains high with steel demand seeing a mild rebound towards 20218 and 2022 levels.

Investment Thesis

A fundamental problem facing US steel manufacturers is the instability in steel prices when paired with the high capital costs and the margin compression that comes with drops in steel price. While this risk has been priced relatively evenly across the stock prices of most US steel producers, we argue that the market has negatively mispriced the effect of volatile steel prices on Nucor, and that the firm should be viewed through a slightly differentiated lens. We believe Nucor is better positioned than other US steel manufacturers to take advantage of technological and operational improvements in a more volatile steel industry. Broader decreases in revenue will limit Nucor's ability to acquire starting in 2024, and we expect the steel industry more broadly to experience losses due to its declining commodity value. Although all steelmakers will face these headwinds, the market has failed to adequately value Nucor's specific resistance to revenue-side risk. Nucor's unparalleled vertical integration and industry leading technology will protect their margins in the face of increasing steel uncertainty, and will allow the firm to take unique advantage of the specific tailwinds that do exist within the steel industry.

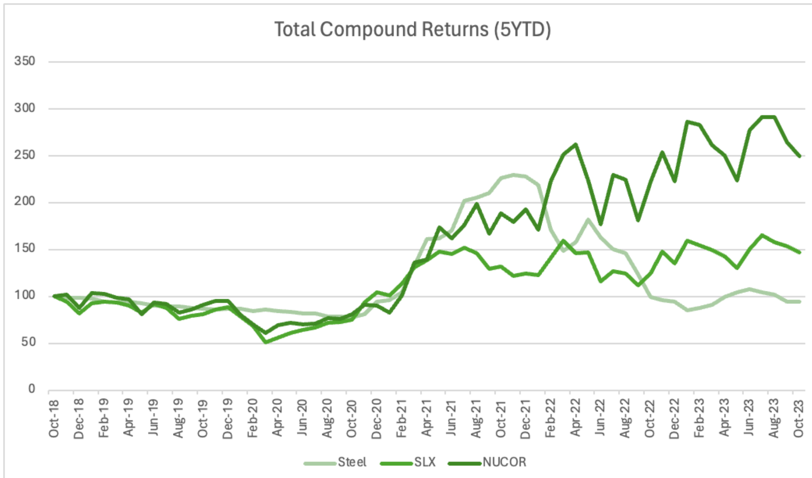


Exhibit 3: NUE consistently outperforms the steel industry during declines in steel prices

Nucor's Operational Efficiency Uniquely Poises It To Weather Uncertainty in Steel

Nucor's exceptional vertical integration across its business operations uniquely positions it to manage uncertainties in the steel industry. This integration, encompassing raw material production, steel milling, and steel product manufacturing, affords Nucor substantial cost savings and enhanced supply chain control, a competitive advantage difficult for peers to replicate. Notably, Nucor's ventures in gas and oil extraction and its air separation utility factor mark industry-first advancements, driving both cost reductions and revenue growth. Importantly, Nucor's strategic forward integration and co-location with their various steel products groups allows for reduced operational costs and increased flexibility, contributing to forecasted cost-savings that independent competitors are unlikely to match in the next decade. Within the context of the significant aforementioned growth expected in many specialty steel products, this gives Nucor a significant advantage in capturing this tailwind.

Additionally, Nucor's management approach reinforces its operational efficiency. With a lean capital structure and a debt-to-cash-on-hand ratio showcasing fiscal prudence, the management team's willingness to pursue innovative solutions, such as the integration of small modular reactors (SMRs) into electric arc furnaces (EAFs), signals a proactive stance towards cost management and environmental sustainability. This strategy not only aligns with efficiency goals but also provides a first-mover advantage in technological adoption. The hands-on experience of upper management, a prerequisite for understanding the nuances of one of the world's most mature industries, ensures well-informed operational and acquisition decisions. This depth of expertise, combined with a strong ROIC and a history of strategic acquisitions, underscores Nucor's ability to maintain a competitive edge amidst industry fluctuations.

Nucor's Technological Advantages Allow It to Take Advantage of Steel Tailwinds & Maintain Margins:

As a whole, Nucor is positioned well to maintain margins in the face of changing prices in the steel industry as a result of its differentiated, risk-embracing approach to technology. Much of Nucor's rise and rapid growth through the 1990s and 2000s was due to their heavy investment in Electric Arc Furnaces (EAFs), which use scrap steel to "recycle" steel, the method by which the US supplies 70% of its steel demand. Importantly, EAFs allow seamless scaling of production capacity, as opposed to blast furnaces which require minimum loads to operate. Today, Nucor has 5,824,000 tons exclusively of EAF capacity. Not only does this reduce operating demand and better align Nucor with the current North American steel outlook, but by allowing Nucor to enjoy comparatively lower and more flexible costs, it allows Nucor to enjoy some level of margin preservation through a likely environment of lower steel prices.

As aforementioned, Nucor also produces a significant amount of specialty steel through its vertically integrated steel products' division. This allows it to respond to industry trends such as an increase in rebar demand and a shift in the automotive industry to demanding more lightweight, efficient, and green steel. Importantly, in addition to Nucor's aforementioned operational advantages in this sector, the firm's first-mover advantage makes it hard for competitors to catch up to their expertise and breadth within these rapidly growing specialty subsegments. Another specialty market that Nucor has a significant advantage in is net-zero steel. Due to government legislation and environmental pressure, both the steel industry and its buyers have been pressured to transition to inputs that limit greenhouse emissions. Nucor is leading the industry in this transition as they have introduced the world's first net-zero steel (across both Scope I and Scope II emissions), allowing them to serve this rapidly growing market demand.

Nucor's management has also demonstrated a willingness to try out-of-the-box, novel solutions to keep Nucor on top technologically. One example is Nucor's partnership with SMR manufacturer NuScale, with a plan to integrate SMRs into Nucor's EAFs. If successful, this plan will result in large cost savings, further vertical integration, and a significant first-mover advantage for Nucor. With electricity making up 15% of EAF costs (and 55% of non-ferrous inputs), this can result in significant cost savings.

Investment Risks

Risk #1: Foreign Competition

China has long been the largest manufacturer and exporter of steel in the world, as they are estimated to manufacture 57% of global steel or just over a million kilotons of steel in 2023, which is approximately 9x the second place of India. Given the drop in Chinese domestic consumption across the board, a core risk facing Nucor and the broader US steel industry is foreign competition. Many industry insiders, including the CEO of Rio Tinto, Jakob Stausholm, estimate that China has neared its peak steel demand this year. No matter the quality of management and operating staff, the offloading of Chinese steel that can't find a consumer domestically on North American shores could be a significant threat to Nucor's revenues and margins.

Mitigating Factors: Risk Internalization & Impact of Tariffs

The current market is pricing Nucor as returning to its 2018 and 2019 margins with slightly higher free cash flow to represent its production expansion. As a result, we believe that it is reasonable to assume that a great deal of the margin compression from foreign competition has been priced in. In addition, the domestic steel industry in particular has benefitted from significant protectionist legislation in recent years, beginning with President Trump's 2018 25% tariff on foreign steel imports and continuing across to President Biden's tariff maintenance and IRA protectionist production requirements. With both parties signaling steadfast adherence to this course of action, steel tariffs are likely to be a continuing mitigating factor of foreign competition.

Risk #2: Adoption of Nucor's Advantages by Competitors

Nucor's competitive edge, derived from advanced steel technology, extensive vertical integration, and superior management, faces the risk of eventual emulation by competitors. Over time, these advantages, though challenging to replicate in the short term, are not insurmountable. For example, Steel Dynamics, led by former Nucor executives, is making strides in mimicking Nucor's vertical integration model – Steel Dynamics has also out-performed Nucor over the last 5 years. Steel Dynamics' youth as a firm means that they may be able to pursue innovation more freely.

Mitigating Factors: First-Mover Advantage & Capital Intensivity

Nucor benefits from its first-mover advantage, especially in specialty steel, where its technological leadership, diverse product range, and established relationships create significant barriers to entry. Additionally, the capital intensity required to reorganize and upgrade steel supply chains poses a substantial challenge to competitors. This, coupled with the relative financial distress of other steel companies, characterized by less lean capital structures and weaker starting positions, further hinders their ability to replicate Nucor's efficient model. Nucor has successfully remained ahead of the curve. For example, Nucor is 100% EAF driven, which required a major production shift over the last decades. These factors collectively reinforce Nucor's resilient market position despite potential competitive threats.

Valuation

Assumptions:

Our base case assumes a return to the EBIT margins of the 2018 world with slight increases over time due to operational efficiency increases – though a majority of increases to free cash flow are sourced from improvements in steel product revenues. SG/A and COG expenses are marked to revenue changes across all models, as SG/A increases are required to increase revenues, while we assume for the base case that COG will. The latter assumption is based on our perception that steel price changes are more impactful on revenue than volume changes – as volume sold is uncorrelated with small to moderate price shifts. Furthermore, capital expenditure is expected to remain consistently high across time, as it is required to maintain and improve productive capacity. Our base case has a 20% implied upside. Our sensitivity table indicates that a terminal growth rate of 1%, as well as a WACC of 11.5% would be the only scenario in which there would be a downside value in our model. Our bear case not only returns to 2018 to 2019 EBIT margins, but also returns free cash flow to 2019 and 2020 levels to include a further price downshift. Though this scenario is unlikely, it is well within the realm of possibility. Assuming capital expenditures remained high to support future production, there would be an implied downside of 43%, given our current pessimistic bear case.

Exhibit 4.1: Bull Case Cash Flow Projections

In Millions	Historical					Projected				
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Raw Materials	2,025	1,664	1,407	2,610	2,262	1062	956	812	731	658
% growth	[redacted]	-17.83%	-15.44%	85.50%	-13.33%	**-53%**	**-10%**	**-15%**	**-10%**	**-10%**
Steel Mills	16,245	13,933	12,109	24,145	24,189	22394	22394	24634	27713	31177
% growth	[redacted]	-14.23%	-13.09%	99.40%	0.18%	**-7%**	**0.0%**	**10.0%**	**12.5%**	**12.5%**
Steel Products	6,797	6,690	6623	9,727	15,060	7795	7795	8380	9637	11082
% growth	[redacted]	-1.57%	-1.00%	46.87%	54.83%	**-48%**	**0.0%**	**7.5%**	**15.0%**	**15%**
Revenue	**25,067**	**22,287**	**20,139**	**36,482**	**41,511**	**31251**	**31145**	**33826**	**38081**	**42917**
% Change	[redacted]	-11.09%	-9.64%	81.15%	13.78%	**-24.72%**	**-0.34%**	**8.61%**	**12.58%**	**12.70%**
COG	20772	19888	17891	25437	28986	26598	26552	27695	29437	31306
% Change	[redacted]	-4.25%	-10.04%	42.18%	13.95%	-8.24%	-0.17%	4.30%	6.29%	6.35%
SG&A	861	733	636	1728	2021	1455	1426	1597	1757	1932
% Change	[redacted]	-14.89%	-13.18%	171.72%	16.94%	-28.00%	-2.00%	12.00%	10.00%	10.00%
Impairment Oil G	110.0	35.0	27.0	42.0	96.0	48	52.8	58.08	63.888	70.2768
% Change	[redacted]	-68.18%	-22.86%	55.56%	128.57%	50.00%	110.00%	110.00%	110.00%	110.00%
EBIT	**3,324**	**1,631**	**1,585**	**9,275**	**10,409**	**3151**	**3114**	**4476**	**6823**	**9608**
% of revenue	13.26%	7.32%	7.87%	25.42%	25.07%	10.08%	10.00%	13.23%	17.92%	22.39%
Effectvie Tax	22.5%	25.3%	-0.03%	22.41%	20.80%	22.50%	22.50%	22.50%	22.50%	22.50%
NOPAT	2576	1219	1586	7196	8243	2442	2413	3469	5288	7446
(+) D&A	829.6	769.7	812.5	906.6	1,157.6	1094	779	846	952	1073
% of revenue	3.31%	3.45%	4.03%	2.48%	2.79%	3.50%	2.50%	2.50%	2.50%	2.50%
(-) CapEx	983	1,477	1,543	1,621	1,947	2031	1869	1691	1523	2146
% of revenue (Cap	3.92%	6.63%	7.66%	4.44%	4.69%	6.50%	6%	5%	4%	5%
NWC	4489	4020	3881	5747	5581	5500	5250	5000	4750	4500
(-) Change in NW	[redacted]	-469	-139	1866	-166	-81	-250	-250	-250	-250
FCF	**2423**	**981**	**994**	**4616**	**7620**	**1585**	**1573**	**2873**	**4967**	**6623**
Discounted FCF	[redacted]					1507	1284	2118	3308	3986

WACC Calculation				
Weighted average of coupon rates (from 10-K)				
Cost of Debt	5.20%			
Risk-Free Rate	4.84%		Beta (unlevered)	1.433
Equity Risk Premium	4.47%	Used Damodaran	Total Debt	6,681
Beta (Levered)	1.80		Total Equity	20,470
Cost of Equity	12.87%		Effective Tax Rat	0.225
			Beta (Levered)	1.80
WACC	10.69%			

Exhibit 4.2: Bull Case WACC Calculation

Terminal Value: Gordon Growth Method	
Terminal Growth Rate	2.00%
Terminal Value	77,733
Present Value of TV	46,778
Sum of Discounted Cash Flows	12,203
Implied Enterprise Value	58,981
Implied Equity Value	57,976
Shares Outstanding	248.72
Implied Share Price	233.10
Current Share Price	**148.11**
Upside	**57.38%**

Exhibit 4.3: Bull Case Gordon Growth Valuation

		Terminal Growth				
		1.00%	1.50%	2.00%	2.50%	3.00%
	10.00%	235	247	261	276	293
	10.5%	221	231	243	256	271
	10.69%	216	226	237	249	263
	11.00%	208	217	227	239	252
WACC	11.50%	196	204	213	223	235

Exhibit 4.4: Bull Case Sensitivity

Exhibit 5.1: Base Case Cash Flow Projections

In Millions	Historical					Projected				
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Raw Materials	2,025	1,664	1,407	2,610	2,262	1062	956	812	731	658
% growth	[redacted]	-17.83%	-15.44%	85.50%	-13.33%	**-53%**	**-10%**	**-15%**	**-10%**	**-10%**
Steel Mills	16,245	13,933	12,109	24,145	24,189	22394	22394	23962	26358	28994
% growth	[redacted]	-14.23%	-13.09%	99.40%	0.18%	**-7%**	**0.0%**	**7.0%**	**10.0%**	**10.0%**
Steel Products	6,797	6,690	6623	9,727	15,060	7795	7405	7776	8359	8986
% growth	[redacted]	-1.57%	-1.00%	46.87%	54.83%	**-48%**	**-5.0%**	**5.0%**	**7.5%**	**8%**
Revenue	**25,067**	**22,287**	**20,139**	**36,482**	**41,511**	**31251**	**30755**	**32550**	**35448**	**38637**
% Change	[redacted]	-11.09%	-9.64%	81.15%	13.78%	**-24.72%**	**-1.59%**	**5.83%**	**8.90%**	**9.00%**
COG	20772	19888	17891	25437	28986	26598	26386	27156	28365	29641
% Change	[redacted]	-4.25%	-10.04%	42.18%	13.95%	-8.24%	-0.79%	2.92%	4.45%	4.50%
SG&A	861	733	636	1728	2021	1455	1426	1597	1757	1932
% Change	[redacted]	-14.89%	-13.18%	171.72%	16.94%	-28.00%	-2.00%	12.00%	10.00%	10.00%
Impairment Oil G	110.0	35.0	27.0	42.0	96.0	48	52.8	58.08	63.888	70.2768
% Change	[redacted]	-68.18%	-22.86%	55.56%	128.57%	50.00%	110.00%	110.00%	110.00%	110.00%
EBIT	**3,324**	**1,631**	**1,585**	**9,275**	**10,409**	**3151**	**2890**	**3738**	**5262**	**6993**
% of revenue	13.26%	7.32%	7.87%	25.42%	25.07%	10.08%	9.40%	11.49%	14.84%	18.10%
Effectvie Tax	22.5%	25.3%	-0.03%	22.41%	20.80%	22.50%	22.50%	22.50%	22.50%	22.50%
NOPAT	2576	1219	1586	7196	8243	2442	2240	2897	4078	5420
(+) D&A	829.6	769.7	812.5	906.6	1,157.6	1094	769	814	886	966
% of revenue	3.31%	3.45%	4.03%	2.48%	2.79%	3.50%	2.50%	2.50%	2.50%	2.50%
(-) CapEx	983	1,477	1,543	1,621	1,947	2031	1845	1627	1418	1932
% of revenue (Cap	3.92%	6.63%	7.66%	4.44%	4.69%	6.50%	6%	5%	4%	5%
NWC	4489	4020	3881	5747	5581	5500	5250	5000	4750	4500
(-) Change in NW	[redacted]	-469	-139	1866	-166	-81	-250	-250	-250	-250
FCF	**2423**	**981**	**994**	**4616**	**7620**	**1585**	**1413**	**2334**	**3796**	**4704**
Discounted FCF	[redacted]					1507	1154	1721	2529	2831

WACC Calculation				
Weighted average of coupon rates (from 10-K)				
Cost of Debt	5.20%			
Risk-Free Rate	4.84%		Beta (unlevered)	1.433
Equity Risk Premium	4.47%	Used Damodaran	Total Debt	6,681
Beta (Levered)	1.80		Total Equity	20,470
Cost of Equity	12.87%		Effective Tax Rat	0.225
			Beta (Levered)	1.80
WACC	10.69%			

Exhibit 5.2: Base Case WACC Calculation

Terminal Value: Gordon Growth Method		
Terminal Growt	2.00%	
Terminal Value	55,206	
Present Value of	33,222	
Sum of Discounte	9,740	
Implied Enterprise	42,962	
Implied Equity Va	41,957	
Shares Outstandin	248.72	
Implied Share Pric	168.69	
Current Share Pric	**148.11**	
Upside	**13.90%**	

Exhibit 5.3: Base Case Gordon Growth Valuation

	Terminal Growth					
		1.00%	1.50%	2.00%	2.50%	3.00%
	9.50%	183	193	204	216	231
	10.5%	161	169	177	186	197
	10.69%	157	165	172	181	191
	11.00%	152	158	166	174	183
WACC	11.50%	143	149	156	163	171

Exhibit 5.4: Base Case Sensitivity

Exhibit 6.1: Bear Case Cash Flow Projections

In Millions	Historical					Projected				
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Raw Materials	2,025	1,664	1,407	2,610	2,262	1062	956	908	863	863
% growth	[redacted]	-17.83%	-15.44%	85.50%	-13.33%	**-53%**	**-10%**	**-5%**	**-5%**	**0%**
Steel Mills	16,245	13,933	12,109	24,145	24,189	21770	21770	23294	24925	26669
% growth	[redacted]	-14.23%	-13.09%	99.40%	0.18%	**-10%**	**0.0%**	**7.0%**	**7.0%**	**7.0%**
Steel Products	6,797	6,690	6623	9,727	15,060	7795	7405	7405	7776	8164
% growth	[redacted]	-1.57%	-1.00%	46.87%	54.83%	**-48%**	**-5.0%**	**0.0%**	**5.0%**	**5%**
Revenue	**25,067**	**22,287**	**20,139**	**36,482**	**41,511**	**30627**	**30131**	**31607**	**33563**	**35696**
% Change	[redacted]	-11.09%	-9.64%	81.15%	13.78%	**-26.22%**	**-1.62%**	**4.90%**	**6.19%**	**6.36%**
COG	20772	19888	17891	25437	28986	26452	26238	26881	27712	28593
% Change	[redacted]	-4.25%	-10.04%	42.18%	13.95%	-8.74%	-0.81%	2.45%	3.09%	3.18%
SG&A	861	733	636	1728	2021	1718	1701	1871	2058	2263
% Change	[redacted]	-14.89%	-13.18%	171.72%	16.94%	-15.00%	-1.00%	10.00%	10.00%	10.00%
Impairment Oil G	110.0	35.0	27.0	42.0	96.0	48	52.8	58.08	63.888	70.2768
% Of Year Prior	[redacted]	-68.18%	-22.86%	55.56%	128.57%	-50.00%	10.00%	10.00%	10.00%	10.00%
EBIT	**3,324**	**1,631**	**1,585**	**9,275**	**10,409**	**2409**	**2140**	**2798**	**3729**	**4769**
% of revenue	13.26%	7.32%	7.87%	25.42%	25.07%	7.87%	7.10%	8.85%	11.11%	13.36%
Effectvie Tax	22.5%	25.3%	-0.03%	22.41%	20.80%	22.50%	22.50%	22.50%	22.50%	22.50%
NOPAT	2576	1219	1586	7196	8243	1867	1658	2168	2890	3696
(+) D&A	829.6	769.7	812.5	906.6	1,157.6	1072	753	790	839	892
% of revenue	3.31%	3.45%	4.03%	2.48%	2.79%	3.50%	2.50%	2.50%	2.50%	2.50%
(-) CapEx	983	1,477	1,543	1,621	1,947	1991	1808	1580	1343	1785
% of revenue (Cap	3.92%	6.63%	7.66%	4.44%	4.69%	6.50%	6%	5%	4%	5%
NWC	4489	4020	3881	5747	5581	5500	5250	5000	4750	4500
(-) Change in NW	[redacted]	-469	-139	1866	-166	-81	-250	-250	-250	-250
FCF	**2423**	**981**	**994**	**4616**	**7620**	**1029**	**854**	**1628**	**2636**	**3054**
Discounted FCF	[redacted]					978	697	1200	1756	1838

WACC Calculation				
Weighted average of coupon rates (from 10-K)				
Cost of Debt	5.20%			
Risk-Free Rate	4.84%		Beta (unlevered)	1.433
Equity Risk Premium	4.47%	Used Damodaran	Total Debt	6,681
Beta (Levered)	1.80		Total Equity	20,470
Cost of Equity	12.87%		Effective Tax Rat	0.225
			Beta (Levered)	1.80
WACC	10.69%			

Exhibit 6.2: Bear Case WACC Calculation

Terminal Value: Gordon Growth Method	
Terminal Growth Rate	2.00%
Terminal Value	35,841
Present Value of TV	21,568
Sum of Discounted Cash Flows	6,470
Implied Enterprise Value	28,038
Implied Equity Value	27,032
Shares Outstanding	248.72
Implied Share Price	108.69
Current Share Price	**148.11**
Upside	**-26.62%**

Exhibit 6.3: Bear Case Gordon Growth Valuation

	Terminal Growth					
		1.00%	1.50%	2.00%	2.50%	3.00%
	10.00%	112	117	124	131	139
	10.5%	105	110	115	121	128
	10.69%	103	107	113	118	125
	11.00%	99	103	108	113	119
WACC	11.50%	94	97	102	106	112

Exhibit 6.4: Bear Case Sensitivity

Exhibit 7.1 : Comparable Companies Analysis

	Market Data			Financial Data			Multiples					
Company	Price	Market Cap ($millions)	TEV	Sales (NTM)	EBIT (LTM)	EPS (NTM)	EV/Sales	EV/EBIT	P/E	Beta (Levered)	D/E	Beta (Unlevered)
Steel Dynamics	111.87	18,530	19,324	17418	3392	11.00	1.06	5.46	10.17	1.48	0.349	1.160
US Steel	34.24	7,637	8,734	1606	1280	2.09	4.76	5.97	16.38	2.09	0.392	1.596
Cleveland-Cliffs	17.12	8,643	12,335	21647	813	1.65	0.40	10.63	10.38	2.16	0.421	1.621
Worthington Industries	63.53	3,174	3,548	4436	254	5.09	0.72	12.50	12.48	1.36	0.288	1.108
ArcelorMittal	23.3	19,553	26,265	69709	5903	3.29	0.28	3.31	7.08	1.92	0.181	1.680
Nucor	152.31	37883	38888	32199	6770	12.98	1.18	5.60	11.73	Mean		1.433

Exhibit 7.2 : Exit Multiples Valuation

EV/EBIT (Trailing)	Mean		7.57
	Median		5.97
	Mean Implied Price	**$**	**206.05**
	Upside		***35.3%***
	Median Implied Price	**$**	**162.40**
	Upside		***6.6%***
P/E (Forward)	Mean		11.30
	Median		10.38
	Mean Implied Share Pr	**$**	**146.65**
	Upside		***-3.7%***
	Median Implied Price	**$**	**134.68**
	Upside		***-11.6%***

Orion Engineered Carbons SA (NYSE: OEC)

Orion Engineered Carbons SA | NYSE: OEC	
Negative | **Neutral** | Positive	
Share price, 11/17/23:	$23.50
Market capitalization:	$1,191.82mm
Shares outstanding:	59.98mm
52-week range:	$16.82/$26.90
EPS (FY23):	$0.26
Beta:	1.16
Average analyst opinion:	$30.80
Price target:	$34.25

Price Chart

Financial Highlights

(Dollars in millions)	2022	2023E	2024E
Revenue	2,030.9	2,091.8	2,154.6
% Growth	*+2.4%*	*+3.0%*	*+3.0%*
EBIT	197.1	198.7	204.7
% Revenue	*9.7%*	*9.5%*	*9.5%*
NWC	225.7	251.0	258.6
% Revenue	*11.1%*	*12.0%*	*12.0%*
FCF	-10.4	-37.9	-20.5

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Investment Overview

Orion Engineered Carbons (NYSE: OEC), referred to as "Orion" or "the company", presents a neutral investment opportunity. Positioned as a leader in a niche market, Orion benefits from its sustainable practices and focus on the electric vehicle (EV) market. However, the company's inability properly to address risks like market dependency, competition in specialty carbon black, and raw material price volatility negates Orion's potential growth opportunities, warranting a cautious stance. Investors should monitor Orion's ability to navigate market dynamics and technological shifts in the evolving specialty carbon black and EV markets.

Company Overview

Company History

Founded in 2011, Orion Engineered Carbons (NYSE: OEC) is a B2B company that specializes in producing the compound carbon black, a crucial component used in manufacturing rubber, plastics, and various other products. Orion plays a vital role in enhancing the performance characteristics of these materials, contributing to the durability and functionality of final products.

Despite its relatively recent founding, Orion's corporate lineage is extensive. The company's history can be traced back 160 years to Süd-Chemie. Süd-Chemie, originally founded in 1856 in Munich, Germany, was a chemical giant involved in various sectors. However, Orion's story didn't begin until the 20th century. In 2002, Süd-Chemie acquired the carbon black business of Degussa AG. Subsequently in 2011, Evonik Industries AG acquired Süd-Chemie, but to comply with regulatory requirements, Evonik divested the carbon black business. This divestiture led to the creation of Orion as a standalone company. OEC had their initial IPO in 2014 where they raised $350 million.

Revenue Model

Orion's product, carbon black, is a reinforcing agent imperative to sectors such as tire manufacturing, automotive coatings, plastics, printing inks, and more. Therefore, Orion operates a B2B business model; the company's revenues stem from supplying high-quality carbon black to a diverse range of industries in the manufacturing space.

In terms of financials, Orion has a simple cost structure categorized by material expenses, energy, and miscellaneous operational costs. Regardless, the company has maintained historic stability with highs and lows stemming from global economic conditions, industrial production, and demand from key end-user industries. Although Orion suffered a loss in revenues during the pandemic, they have fully bounced back in 2023, reaching new highs.

Market Positioning

Market positioning for Orion is notable due to the company's focus on specialty carbon blacks, a product that has niche applications that often command higher price points than the industry standard. Moreover, Orion's emphasis on sustainability and innovation further contributes to its competitive edge in the evolving market landscape. The company is currently the world's largest manufacturer of pigment blacks and the third-largest manufacturer of rubber blacks for many blue-chip companies.

Recent projects undertaken by Orion include the 'circular carbon black' project in Germany where they are investing 12.8 million euros, 6.4 million of which come from funding from the German government and the European Union, to develop processes to produce carbon black from alternative carbon sources.

Industry Overview

Competitive Landscape

The global carbon black market has witnessed significant growth in recent years. The Total Addressable Market (TAM) for carbon black is approximately $20 billion (2022). The industry had a Compound Annual Growth Rate (CAGR) of around 4.5% over the past five years. This growth is mainly driven by the increasing demand in the automotive and industrial sectors, where carbon black is extensively used as a reinforcing agent in tires and various other rubber products. Additionally, its use in plastic, inks, coatings, and other applications contributes to its value proposition. The growth factors include urbanization, rising disposable incomes, and an increasing number of vehicles on the road.

Key Industry Trends

- Shift towards Environmentally Friendly Products: With growing environmental concerns, there's a trend towards the production of green or sustainable carbon black using recycled or bio-based materials.
- High-performance Carbon Black: As end-user industries demand superior performance, there's a trend toward specialized high-performance carbon black products.
- Automotive Lightweighting: To achieve better fuel efficiency, there's a push for lightweighting in the automotive sector. This trend demands carbon black products that can provide strength without adding weight.

Cost Structure

The primary business model in the carbon black industry revolves around volume-based sales, though there might be long-term supply contracts in place with major buyers. Major costs include raw materials (like crude oil), energy, and logistics. There are considerable economies of scale, with larger players like Orion benefiting from cost efficiencies. Usually, market leaders and large-scale producers dictate pricing, but fluctuations in raw material prices can influence the industry pricing dynamics.

Barriers to Entry

- Capital Intensiveness: Setting up carbon black production facilities demands substantial capital, discouraging new entrants.
- Technical Expertise: Producing specialized variants requires intricate knowledge and R&D capabilities.
- Regulatory Barriers: Given environmental concerns associated with carbon black production, there are stringent regulations in place, creating another barrier for new entrants.

Key Players: Apart from Orion, other significant players in the market include Cabot Corporation, Birla Carbon, and Phillips Carbon Black Limited, among others.

Challenges: The industry faces challenges in terms of fluctuating raw material prices, strict environmental regulations, and competition from substitute products.

Investment Thesis

Specialization in Specialty Carbon Black

Orion is a global leader for supplying carbon black, and particularly specializes in manufacturing rubber and specialty carbon black that are frequently used in higher-performance applications such as inks, tires, polymers, printings, batteries, and plastics. Orion's focus on specialization is less influenced by the cyclicality of the rubber and motor vehicle industry, especially as the specialized carbon black market is not as dependent on these industries for demand compared to the rest of the carbon black market.

Currently, the specialty carbon black market represents 10% of the general carbon black market, based on tonnage, and simultaneously commands higher prices compared to the general carbon black market. While the sector is expected to grow 4.8% through 2030, the specialty carbon black market is projecting growth forecasts of over 7.0%. Specifically, growth is most expected from the non-rubber sectors that utilize specialty blacks, including plastics and paints. Orion's positioning as an industry leader in this niche sector enables the company to harness the most benefits from this growth, especially compared to its competitors. Although there are many players in the market, there are only a select few key players in the market for specialty blacks. However, it is important to note that specialization in speciality carbon black, especially in an emerging industry can be associated with higher levels of risk.

In recent news, Orion has gone under the process of debottlenecking its high-jetness speciality carbon black plant in Cologne, Germany to increase production capabilities, and is also planning to build out a second post-treatment facility as a result of consistently growing demand. Orion is one of the only companies that is able to push jetness over a certain level, particularly for products that are used in automotive coatings.

Orion S.A. exemplifies a circular production model, leveraging its deep-rooted sustainable history for customer loyalty, while its robust R&D initiatives pave the way for enduring sustainability

Orion S.A. stands at the forefront of sustainable innovation, transforming industrial waste into essential materials. By upcycling byproducts like heavy slurry oil, coal tar, and acetylene gas, Orion not only prevents these materials from being incinerated but also significantly reduces greenhouse gas emissions. The company's production of carbon black, a versatile material derived from these waste products, epitomizes the circular economy in action. Their recent showcase at The 36th Western Coatings Symposium and Show, introducing new circular grades, underscores their commitment to this circular production model.

Orion's commitment to sustainability is not a recent endeavor. Founded over 160 years ago, the company has consistently prioritized eco-friendly practices. This long-standing history of sustainable operations has not only bolstered its reputation but has also played a pivotal role in customer retention. Customers, increasingly conscious of their environmental footprint, are more likely to align with a brand that has a proven track record of sustainable practices. Orion's decision to invest $13.7M in sustainable carbon black development further solidifies its commitment to this legacy.

Orion's dedication to research and development is evident in its continuous efforts to enhance the sustainability of its products. The company's involvement in the EU-funded BlackCycle project and its exploration of reusing carbon black from discarded tires are testaments to its forward-thinking approach. Furthermore, Orion's investment in replacing fossil fuel-based feedstock with renewable oils showcases its commitment to a greener future. Their recent achievement of the 2022 emissions targets in the U.S. demonstrates the tangible results of their R&D efforts, ensuring that they remain at the cutting edge of sustainable production.

Carbon black, produced by Orion, plays a multifaceted role in promoting sustainability. Its addition to products like tires enhances their durability, reducing the frequency of replacements and subsequent waste. Moreover, its UV protective properties extend the lifespan of products exposed to sunlight, further minimizing waste. In the realm of renewable energy, carbon black's presence in high-voltage cables used by solar and wind farms facilitates the reduction of emissions. The introduction of the PRINTEX kappa 50 conductive carbon black and other new grades at recent symposiums highlights the ongoing evolution of this crucial material.

Orion's dedication to combating climate change is unwavering. Recognizing the urgency of transitioning to a low carbon future, the company has outlined clear targets and measures addressing GHG emissions, energy efficiency, water management, and more. Their involvement in the circular economy, especially in the tire industry, further underscores their commitment. The recent announcement that Orion achieved its 2022 emissions targets, leading to a reduction in interest payments on its sustainability-linked term loan, showcases the financial benefits of their sustainable practices.

Orion Engineered Carbons' steadfast commitment to sustainability not only positions the company as an industry leader but also offers compelling reasons for it to be valued higher, particularly in regards to public opinion and customer perspective. In an era where environmental consciousness and corporate responsibility are paramount, Orion's circular production model and dedication to sustainable practices serve as a beacon of hope for a greener future. Their history of over 160 years of eco-friendly operations provides a sense of trust and reliability, which resonates strongly with businesses who increasingly prioritize environmental values. Businesses who buy from Orion can utilize their sustainability practices to improve their own social impact. By upcycling industrial waste into valuable materials and continuously pushing the boundaries of sustainable innovation through R&D, Orion is not just meeting current environmental standards but actively shaping future industry norms. Their tangible achievements in reducing greenhouse gas emissions, achieving sustainability targets, and collaborating on cutting-edge projects like the BlackCycle initiative demonstrate a company that is taking real, measurable steps towards a more sustainable world. As a result, this commitment to sustainability should be a catalyst for both increased public goodwill and a higher valuation, as customers and investors alike recognize the long-term value of a company that not only talks the talk but consistently walks the walk towards a more environmentally responsible future.

Orion’s carbon black product is able to capture EV market growth.

Orion’s carbon black product is well positioned to capture the growing demand associated with electric vehicles. Carbon black is a versatile compound with a diverse set of applications. A notable one of which is its use in EVs. Specifically, carbon black is involved in two imperative areas within the EV market: the vehicle’s frame and its battery.

Carbon black is used to make EV frames lighter. Energy efficiency is immensely important to electric cars. In order to better compete with gas powered vehicles, EV’s need to optimize every single one of their components. A popular method of increasing energy efficiency is reducing the vehicle’s weight. Orion’s carbon black product has been used in EV tires to accomplish this aim. The compound’s lower density, but similar properties to traditional rubber composites makes carbon black an ideal material.

Additionally, carbon black is used to increase the efficiency of lithium-ion batteries. Lithium-ion batteries are rechargeable power cells that have become synonymous with the EV industry. Carbon black is used to coat the electrodes, the positively and negatively charged pieces of the battery. The compound facilitates the battery's power generation process, acting as a critical conductor for electrical charges. However, carbon black is not the only material capable of achieving this greater conductivity. Specifically, graphite is commonly used within lithium-ion batteries, but, given graphites higher price point, batteries often blend graphite and carbon black. In short, despite substitutes, carbon black will still be in demand.

With the EV market’s impressive investment forecast, Orion, with its carbon black product, is uniquely able to tackle niche corners of this market and see impressive growth. Although there are competitors in the carbon black space, Orion is the leader within the western hemisphere. Moreover, the company’s plan to build a base of operations in the US will further aid relations with leaders in the EV industry. In essence, given the tailwinds attached to the EV market and Orion’s competitive positioning, the company should be able to capitalize.

Investment Risks

Risk 1: Market Dependency and Competition in the Specialty Carbon Black Sector

Orion's specialization in specialty carbon black is a strength, but it also exposes the company to market fluctuations and competition. The specialty carbon black market is relatively small compared to the general carbon black market. As a result, the company's financial performance can be sensitive to changes in demand for specialized applications like inks, batteries, and plastics. Increased competition or fluctuations in demand for specialty carbon black could impact Orion's revenue and profitability.

Mitigant: Adaptation through Numerous Production Plants

Orion is attempting to address its exposure to market fluctuations and competition through its geographic diversification: innovation centers and 15 production plants scattered across three continents. This diversified network allows Orion to adapt to changing market conditions, optimize production processes, and swiftly respond to increased competition, thereby reducing the potential impact of fluctuations in demand for specialty carbon black on the company's revenue and profitability. However, this does not appear to be a sufficient mitigant if the innovation centers and production plants are not effectively aligned with market trends and demands. Orion would need more comprehensive risk management beyond just geographic diversification to mitigate the market fluctuations and competition.

Risk 2: Raw Material Price Volatility

Orion's sustainable model involves upcycling industrial waste materials into carbon black. However, the availability and cost of these waste materials can be subject to market fluctuations. Price volatility or shortages in the procurement of heavy slurry oil, coal tar, and acetylene gas could affect the company's production costs and, subsequently, its profitability. Additionally, if regulations or supply chain disruptions impact the availability of these waste materials, Orion may face operational challenges.

Mitigant: Reduction in Raw Material Consumption

Orion is actively working on the implementation of a contingency plan to reduce natural gas and other raw material consumption. This plan will enhance cost management and reduce the impact of raw material price fluctuations on the company's profitability, providing a more stable financial outlook for the future. However, the intricacies of this plan have not been released for public viewing yet. So as it stands, Orion does not seem to be able to properly decrease the cost effects of raw material price volatility.

Risk 3: EV Market Dependency and Technological Changes

While the electric vehicle (EV) market is experiencing significant growth, it is also characterized by rapid technological advancements. Orion's reliance on the EV market for the demand of its carbon black products for lithium-ion batteries makes it vulnerable to changes in battery technology. If alternative materials or technologies emerge that reduce the dependence on carbon black in battery production, Orion's growth prospects within this sector could be negatively impacted. It's crucial for the company to adapt and innovate continuously to stay relevant in the ever-evolving EV market.

Mitigant: Continuous Innovation and Technological Partnerships

Orion is actively trying to stay at the forefront of technological advancements and actively engage in partnerships with key players in the EV and battery industries. In order to properly mitigate the market dependency, Orion needs to increase investments in research and development, the company can ensure its carbon black products remain essential to evolving battery technologies. Orion should also explore ways to adapt its products to new energy storage technologies beyond lithium-ion batteries, such as solid-state batteries or advanced supercapacitors. Diversifying its customer base by supplying carbon black to other industries where its properties are valuable, like electronics or aerospace, can help reduce dependency on the EV market. Furthermore, maintaining a flexible production process that can quickly adjust to changes in product specifications will enable Orion to stay competitive and relevant in the face of technological shifts. Regularly assessing market trends and consumer demands will also provide early insights into potential changes in product requirements. Without Orion doing these, they may still be subject to negative impacts within this sector.

Valuation

In evaluating OEC's investment prospects, a 10-year projection has been undertaken due to the company's substantial capital expenditures impacting financials. The analysis encompasses historical and forecasted figures for revenue, EBIT, and Free Cash Flow, with a nuanced approach considering both upsides and downsides, leading to a "Hold" recommendation. The Weighted Average Cost of Capital (WACC) has been calculated to discount future cash flows, employing the Gordon Growth Method and Exit Multiples Method for valuation. Sensitivity tables account for variations in terminal growth rates and exit multiples, while the implied share price indicates potential upside or downside relative to the current stock price.

Exhibit 1: Carbon Black Producer Comparables

Company	EV/EBITDA	PE ratio	P/BV	EV / Revenue	Levered Beta	Beta Capital	EV/EBIT
Orion	6.71	11.23	2.40	0.99	1.09	1.53	
Cabot	7.91	29.07	4.55	1.32	0.82	1.22	10.78
Imerys	6.51	12.26	1.02	1.06	1.35	1.51	10.4
Koppers	7.18	8.24	1.36	0.78	1.35	1.83	12.83
Mitsubishi Chemical Group	6.55	5.91	0.61	0.80	0.49	0.6	13.19
Tokai Carbon Co	5.37	10.43	0.78	1.12	0.43	0.7	10.98
OCI Holdings Company	3.68	3.24	0.72	0.84	1.29	1.3	4.33
low	3.68	3.24	0.61	0.78	0.43		
mean	**6.27**	**11.48**	**1.63**	**0.99**	**0.97**		
median	6.55	10.43	1.02	0.99	1.09		
high	7.91	29.07	4.55	1.32	1.35		

Exhibit 2: Other Specialty Chemicals Comparables

Specialty Che	EV/EBITDA	PE ratio	P/BV	EV / Revenue
Avient	9.20	15.31	3.20	1.48
Element Solutions	12.07	25.87	2.00	2.75
Eastman	9.06	14.20	1.80	1.49
Low	9.06	14.20	1.80	1.48
Mean	**10.11**	**18.46**	**2.33**	**1.91**
Median	9.20	15.31	2.00	1.49
High	12.07	25.87	3.20	2.75

Exhibit 3: Base Case DCF

	Historical					Projected									
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Revenue	1,578.20	1,476.40	1,136.40	1,546.80	2,030.90	2,091.83	2,154.58	2,229.99	2,308.04	2,388.82	2,472.43	2,558.97	2,635.74	2,701.63	2,769.17
revenue growth	*0.00%*	*-6.45%*	*-23.03%*	*36.11%*	*2.43%*	*3.00%*	*3.00%*	*3.50%*	*3.50%*	*3.50%*	*3.50%*	*3.50%*	*3.00%*	*2.50%*	*2.50%*
EBIT	171.67	147.20	64.50	140.80	197.10	198.72	204.69	211.85	219.26	226.94	234.88	243.10	250.39	256.65	263.07
%rev	*10.88%*	*9.97%*	*5.68%*	*9.10%*	*9.71%*	*9.50%*	*9.50%*	*9.50%*	*9.50%*	*9.50%*	*9.50%*	*9.50%*	*9.50%*	*9.50%*	*9.50%*
(+) D&A	78.16	83.80	88.40	96.30	99.10	104.59	107.73	111.50	115.40	119.44	111.26	107.48	105.43	94.56	83.08
%rev	*4.95%*	*5.68%*	*7.78%*	*6.23%*	*4.88%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*4.50%*	*4.20%*	*4.00%*	*3.50%*	*3.00%*
(-) CapEx	(116.20)	(155.80)	(144.90)	(214.70)	(232.80)	(251.02)	(258.55)	(267.60)	(276.97)	(286.66)	(247.24)	(179.13)	(158.14)	(148.59)	(138.46)
%rev	*-7.36%*	*-10.55%*	*-12.75%*	*-13.88%*	*-11.46%*	*-12.00%*	*-12.00%*	*-12.00%*	*-12.00%*	*-12.00%*	*-10.00%*	*-7.00%*	*-6.00%*	*-5.50%*	*-5.00%*
NWC	254.98	222.51	175.80	216.30	225.70	251.02	258.55	267.60	276.97	286.66	296.69	255.90	210.86	189.11	166.15
%rev	*16.16%*	*15.07%*	*15.47%*	*13.98%*	*11.11%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*10.00%*	*8.00%*	*7.00%*	*6.00%*
Change in NWC	[redacted]	(32.48)	(46.71)	40.50	9.40	25.32	7.53	9.05	9.37	9.69	10.03	(40.80)	(45.04)	(21.74)	(22.96)
FCF		59.60	33.64	-64.08	-10.37	-37.92	-20.51	-22.48	-23.27	-24.08	12.16	132.86	160.95	140.55	144.74
Discounted FCF	[redacted]					(35.00)	(17.47)	(17.68)	(16.89)	(16.13)	7.52	75.83	84.79	68.34	64.96

WACC Calculation	
Risk Free	4.84%
Unlevered Beta	0.74
Levered Beta	1.16
Equity Risk Premiun	4.47%
	-
Effective Tax Rate	32.66%
Cost of Equity	10.04%
Post-tax Cost of Deb	7.57%
Current Stock Price	19.87
Shares Outstanding	59.98
Market Cap	1,192
Total Debt	1,013.60
Net Debt	934.10
Shareholders Equity	459.4
Percent Equity	31.19%
Percent Debt	68.81%
WACC	8.34%

Terminal Value: Gordon Growth Method	
Terminal Growth Rate	2.00%
Terminal Value	2,328.25
Present Value of TV	1,044.96
Sum of Near Term Cash Flows	198.26
Implied Enterprise Value	1,243.22
Implied Equity Value	309.12
Implied Share Price	5.15
Upside/Downside	-74.06%

Terminal Value: Exit Multiples Method	
Median EV/EBITDA	8.12
Terminal Value	2,136.14
Present Value of TV	958.74
Sum of Near Term Cash Flows	198.26
Implied Enterprise Value	1,157.00
Implied Equity Value	222.90
Implied Share Price	3.72
Upside/Downside	-81.30%

Sensitivity Table: Gordon Growth Method

	WACC							
		7%	7.50%	8%	8.50%	9%	9.50%	10%
	0%	$ 5.75	$ 3.65	$ 1.82	$ 0.23	$ (1.16)	$ (2.40)	$ (3.50)
	0.50%	$ 7.19	$ 4.84	$ 2.83	$ 1.09	$ (0.44)	$ (1.77)	$ (2.96)
	1%	$ 8.88	$ 6.23	$ 3.98	$ 2.05	$ 0.38	$ (1.08)	$ (2.36)
Growth Rate	1.50%	$ 10.86	$ 7.84	$ 5.31	$ 3.15	$ 1.31	$ (0.29)	$ (1.69)
	2%	$ 13.25	$ 9.75	$ 6.85	$ 4.43	$ 2.36	$ 0.59	$ (0.94)
	2.50%	$ 16.17	$ 12.04	$ 8.68	$ 5.91	$ 3.59	$ 1.61	$ (0.08)
	3%	$ 19.81	$ 14.83	$ 10.88	$ 7.66	$ 5.01	$ 2.78	$ 0.89
	3.50%	$ 24.50	$ 18.33	$ 13.56	$ 9.77	$ 6.69	$ 4.15	$ 2.01

Sensitivity Table: Exit Multiples Method

	WACC							
		7%	7.50%	8%	8.50%	9%	9.50%	10%
	7	$ 3.83	$ 2.93	$ 2.07	$ 1.26	$ 0.48	$ (0.26)	$ (0.96)
	7.5	$ 4.95	$ 3.99	$ 3.09	$ 2.23	$ 1.41	$ 0.63	$ (0.12)
	8	$ 6.06	$ 5.06	$ 4.10	$ 3.20	$ 2.33	$ 1.51	$ 0.73
Exit Multiples	8.5	$ 7.18	$ 6.12	$ 5.12	$ 4.17	$ 3.26	$ 2.40	$ 1.57
	9	$ 8.29	$ 7.19	$ 6.14	$ 5.14	$ 4.18	$ 3.28	$ 2.42
	9.5	$ 9.41	$ 8.25	$ 7.15	$ 6.11	$ 5.11	$ 4.17	$ 3.26
	10	$ 10.52	$ 9.31	$ 8.17	$ 7.08	$ 6.04	$ 5.05	$ 4.11
	10.5	$ 11.64	$ 10.38	$ 9.18	$ 8.05	$ 6.96	$ 5.93	$ 4.96

Exhibit 4: Bull Case DCF

	Historical					Projected									
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Revenue	1,578.20	1,476.40	1,136.40	1,546.80	2,030.90	2,193.37	2,379.81	2,593.99	2,827.45	3,081.92	3,374.70	3,695.30	4,064.83	4,471.31	4,918.45
revenue growth	*0.00%*	*-6.45%*	*-23.03%*	*36.11%*	*2.43%*	*8%*	*8.5%*	*9%*	*9%*	*9%*	*9.5%*	*9.5%*	*10%*	*10%*	*10%*
EBIT	171.67	147.20	64.50	140.80	197.10	263.20	285.58	311.28	339.29	385.24	421.84	461.91	528.43	581.27	639.40
%rev	*10.88%*	*9.97%*	*5.68%*	*9.10%*	*9.71%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*12.50%*	*12.50%*	*12.50%*	*13.00%*	*13.00%*	*13.00%*
(+) D&A	78.16	83.80	88.40	96.30	99.10	109.67	118.99	129.70	141.37	154.10	151.86	155.20	162.59	156.50	147.55
%rev	*4.95%*	*5.68%*	*7.78%*	*6.23%*	*4.88%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*4.50%*	*4.20%*	*4.00%*	*3.50%*	*3.00%*
(-) CapEx	(116.20)	(155.80)	(144.90)	(214.70)	(232.80)	(263.20)	(285.58)	(311.28)	(339.29)	(369.83)	(337.47)	(258.67)	(243.89)	(245.92)	(245.92)
%rev	*-7.36%*	*-10.55%*	*-12.75%*	*-13.88%*	*-11.46%*	*-12.00%*	*-12.00%*	*-12.00%*	*-12.00%*	*-12.00%*	*-10.00%*	*-7.00%*	*-6.00%*	*-5.50%*	*-5.00%*
NWC	254.98	222.51	175.80	216.30	225.70	263.20	285.58	311.28	339.29	369.83	404.96	369.53	325.19	312.99	295.11
%rev	*16.16%*	*15.07%*	*15.47%*	*13.98%*	*11.11%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*10.00%*	*8.00%*	*7.00%*	*6.00%*
Change in NWC	[redacted]	(32.48)	(46.71)	40.50	9.40	37.50	22.37	25.70	28.02	30.54	35.13	(35.43)	(44.34)	(12.19)	(17.89)
FCF	[redacted]	59.60	33.64	-64.08	-10.37	-13.79	3.36	2.34	2.55	13.16	63.34	243.03	318.91	314.21	350.11
Discounted FCF	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(12.73)	2.86	1.84	1.85	8.82	39.16	138.71	168.00	152.79	157.13

WACC Calculation	
Risk Free	4.84%
Unlevered Beta	0.74
Levered Beta	1.16
Equity Risk Premiur	4.47%
	-
Effective Tax Rate	32.66%
Cost of Equity	10.04%
Post-tax Cost of Deb	7.57%
Current Stock Price	19.87
Shares Outstanding	59.98
Market Cap	1,192
Total Debt	1,013.60
Net Debt	934.10
SE	459.40
Percent Equity	31.19%
Percent Debt	68.81%
WACC	8.34%

Terminal Value: Gordon Growth Method	
Terminal Growth Rate	2.00%
Terminal Value	5,631.69
Present Value of TV	2,527.60
Sum of Near Term Cash Flows	658.45
Implied Enterprise Value	3,186.05
Implied Equity Value	2,251.95
Implied Share Price	37.54
Upside/Downside	88.95%

Terminal Value: Exit Multiples Method	
Median EV/EBITDA	8.12
Terminal Value	5,191.91
Present Value of TV	2,330.22
Sum of Near Term Cash Flows	658.45
Implied Enterprise Value	2,988.67
Implied Equity Value	2,054.57
Implied Share Price	34.25
Upside/Downside	72.39%

Sensitivity Table: Gordon Growth Method

		WACC						
		7%	7.50%	8%	8.50%	9%	9.50%	10%
	0%	$ 39.01	$ 33.91	$ 29.50	$ 25.64	$ 22.25	$ 19.26	$ 16.59
	0.50%	$ 42.50	$ 36.81	$ 31.93	$ 27.70	$ 24.01	$ 20.76	$ 17.89
	1%	$ 46.57	$ 40.16	$ 34.71	$ 30.04	$ 25.99	$ 22.45	$ 19.34
Growth Rate	1.50%	$ 51.38	$ 44.06	$ 37.92	$ 32.70	$ 28.23	$ 24.35	$ 20.96
	2%	$ 57.15	$ 48.67	$ 41.66	$ 35.78	$ 30.79	$ 26.50	$ 22.78
	2.50%	$ 64.21	$ 54.21	$ 46.09	$ 39.37	$ 33.74	$ 28.95	$ 24.84
	3%	$ 73.03	$ 60.97	$ 51.39	$ 43.62	$ 37.18	$ 31.79	$ 27.20
	3.50%	$ 84.36	$ 69.43	$ 57.88	$ 48.71	$ 41.26	$ 35.09	$ 29.92

Sensitivity Table: Exit Multiples Method

		WACC						
		7%	7.50%	8%	8.50%	9%	9.50%	10%
	7	$ 34.55	$ 32.35	$ 30.26	$ 28.27	$ 26.38	$ 24.57	$ 22.86
	7.5	$ 37.26	$ 34.94	$ 32.73	$ 30.63	$ 28.63	$ 26.72	$ 24.91
	8	$ 39.97	$ 37.53	$ 35.20	$ 32.99	$ 30.88	$ 28.88	$ 26.97
Exit Multiples	8.5	$ 42.68	$ 40.11	$ 37.67	$ 35.35	$ 33.13	$ 31.03	$ 29.02
	9	$ 45.39	$ 42.70	$ 40.14	$ 37.70	$ 35.38	$ 33.18	$ 31.08
	9.5	$ 48.10	$ 45.29	$ 42.61	$ 40.06	$ 37.64	$ 35.33	$ 33.13
	10	$ 50.81	$ 47.87	$ 45.08	$ 42.42	$ 39.89	$ 37.48	$ 35.19
	10.5	$ 53.52	$ 50.46	$ 47.55	$ 44.77	$ 42.14	$ 39.63	$ 37.24

Exhibit 5: Bear Case DCF

	Historical					Projected									
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Revenue	1,578.20	1,476.40	1,136.40	1,546.80	2,030.90	2,091.83	2,154.58	2,208.45	2,252.62	2,275.14	2,263.77	2,241.13	2,129.07	1,958.75	1,723.70
revenue growth	*0.00%*	*-6.45%*	*-23.03%*	*36.11%*	*2.43%*	*3.00%*	*3.00%*	*2.50%*	*2.00%*	*1.00%*	*-0.50%*	*-1.00%*	*-5.00%*	*-8.00%*	*-12.00%*
EBIT	171.67	147.20	64.50	140.80	197.10	198.72	193.91	187.72	168.95	159.26	158.46	156.88	149.04	137.11	120.66
%rev	*10.88%*	*9.97%*	*5.68%*	*9.10%*	*9.71%*	*9.50%*	*9.00%*	*8.50%*	*7.50%*	*7.00%*	*7.00%*	*7.00%*	*7.00%*	*7.00%*	*7.00%*
(+) D&A	78.16	83.80	88.40	96.30	99.10	104.59	107.73	110.42	112.63	113.76	101.87	94.13	85.16	68.56	51.71
%rev	*4.95%*	*5.68%*	*7.78%*	*6.23%*	*4.88%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*5.00%*	*4.50%*	*4.20%*	*4.00%*	*3.50%*	*3.00%*
(-) CapEx	(116.20)	(155.80)	(144.90)	(214.70)	(232.80)	(251.02)	(258.55)	(220.84)	(225.26)	(182.01)	(158.46)	(156.88)	(106.45)	(88.14)	(51.71)
%rev	*-7.36%*	*-10.55%*	*-12.75%*	*-13.88%*	*-11.46%*	*-12.00%*	*-12.00%*	*-10.00%*	*-10.00%*	*-8.00%*	*-7.00%*	*-7.00%*	*-5.00%*	*-4.50%*	*-3.00%*
NWC	254.98	222.51	175.80	216.30	225.70	251.02	258.55	265.01	270.31	273.02	271.65	224.11	170.33	137.11	103.42
%rev	*16.16%*	*15.07%*	*15.47%*	*13.98%*	*11.11%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*12.00%*	*10.00%*	*8.00%*	*7.00%*	*6.00%*
Change in NWC	[redacted]	(32.48)	(46.71)	40.50	9.40	25.32	7.53	6.46	5.30	2.70	(1.37)	(47.54)	(53.79)	(33.21)	(33.69)
FCF	[redacted]	59.60	33.64	-64.08	-10.37	-37.92	-27.76	9.53	-4.16	36.29	51.49	90.43	132.86	105.96	114.95
Discounted FCF	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	(35.00)	(23.65)	7.49	(3.02)	24.31	31.84	51.62	69.99	51.52	51.59

WACC Calculation	
Risk Free	4.84%
Unlevered Beta	0.74
Levered Beta	1.16
Equity Risk Premiur	4.47%
	-
Effective Tax Rate	32.66%
Cost of Equity	10.04%
Post-tax Cost of Deb	7.57%
Current Stock Price	19.87
Shares Outstanding	59.98
Market Cap	1,192
Total Debt	1,013.60
Net Debt	934.10
SE	459.40
Percent Equity	31.19%
Percent Debt	68.81%
WACC	8.34%

Terminal Value: Gordon Growth Method	
Terminal Growth Rate	2.00%
Terminal Value	1,848.98
Present Value of TV	829.85
Sum of Near Term Cash Flows	226.69
Implied Enterprise Value	1,056.55
Implied Equity Value	122.45
Implied Share Price	2.04
Upside/Downside	-89.73%

Terminal Value: Exit Multiples Method	
Median EV/EBITDA	8.12
Terminal Value	979.75
Present Value of TV	439.73
Sum of Near Term Cash Flows	226.69
Implied Enterprise Value	666.42
Implied Equity Value	-267.68
Implied Share Price	-4.46
Upside/Downside	-122.46%

Sensitivity Table: Gordon Growth Method

		WACC						
		7%	7.50%	8%	8.50%	9%	9.50%	10%
	0%	$ 2.59	$ 0.89	$ (0.58)	$ (1.87)	$ (3.01)	$ (4.02)	$ (4.91)
	0.50%	$ 3.74	$ 1.84	$ 0.21	$ (1.20)	$ (2.43)	$ (3.52)	$ (4.49)
	1%	$ 5.07	$ 2.94	$ 1.13	$ (0.43)	$ (1.79)	$ (2.97)	$ (4.01)
Growth Rate	1.50%	$ 6.65	$ 4.22	$ 2.18	$ 0.44	$ (1.05)	$ (2.35)	$ (3.48)
	2%	$ 8.55	$ 5.74	$ 3.41	$ 1.45	$ (0.21)	$ (1.64)	$ (2.88)
	2.50%	$ 10.86	$ 7.55	$ 4.86	$ 2.63	$ 0.76	$ (0.83)	$ (2.21)
	3%	$ 13.76	$ 9.78	$ 6.61	$ 4.03	$ 1.89	$ 0.10	$ (1.43)
	3.50%	$ 17.48	$ 12.55	$ 8.74	$ 5.70	$ 3.23	$ 1.18	$ (0.54)

Sensitivity Table: Exit Multiples Method

		WACC						
		7%	7.50%	8%	8.50%	9%	9.50%	10%
	7	$ (4.17)	$ (4.67)	$ (5.16)	$ (5.62)	$ (6.06)	$ (6.48)	$ (6.87)
	7.5	$ (3.66)	$ (4.19)	$ (4.69)	$ (5.17)	$ (5.63)	$ (6.07)	$ (6.49)
	8	$ (3.14)	$ (3.70)	$ (4.23)	$ (4.73)	$ (5.21)	$ (5.66)	$ (6.10)
Exit Multiples	8.5	$ (2.63)	$ (3.21)	$ (3.76)	$ (4.28)	$ (4.78)	$ (5.26)	$ (5.71)
	9	$ (2.12)	$ (2.72)	$ (3.29)	$ (3.84)	$ (4.36)	$ (4.85)	$ (5.32)
	9.5	$ (1.61)	$ (2.23)	$ (2.83)	$ (3.39)	$ (3.93)	$ (4.45)	$ (4.94)
	10	$ (1.10)	$ (1.75)	$ (2.36)	$ (2.95)	$ (3.51)	$ (4.04)	$ (4.55)
	10.5	$ (0.59)	$ (1.26)	$ (1.90)	$ (2.50)	$ (3.08)	$ (3.63)	$ (4.16)

Fall 2023
Promontory Investment Research
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Vertex Pharmaceuticals Incorporated (NASDAQ: VRTX)

Vertex Pharmaceuticals Incorporated | NASDAQ: VRTX		
Negative	Neutral	**Positive**

Share price, 11/18/23:	$350.50
Market capitalization:	$90.32 B
Shares outstanding:	257.4 MM
52-week range:	$282.21/$387.42
EPS (FY23):	$2.69
Beta:	1.27
Price target:	$419.61

Price Chart

Financial Highlights

(Dollars in millions)	2020	2021	2022
Revenue	23,601	22,929	28,091
% Growth	*-20.8%*	*-2.8%*	*22.5%*
EBITDA	3,652	4,469	5,820
% Growth	*-34.4%*	*22.4%*	*30.2%*
EPS	-7.57	1.32	2.39

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Investment Overview

We recommend a **BUY** rating for Vertex Pharmaceuticals Incorporated. With its cost-effective rational drug design as opposed to traditional combinatorial chemistry, strong economic moat and growth prospects in the cystic fibrosis (CF) space, and its new drug Exa-cel's upcoming launch holds promising results, we believe Vertex's expansion into high-growth verticals and technological edge will capture an outsized share of market growth over the next decade.

Company Overview

Background

Vertex is an American biopharmaceutical firm based in Boston, Massachusetts. It is one of the first biotech firms founded on a research and development strategy of rational drug design rather than combinatorial chemistry, which has allowed Vertex to both develop superior treatments more cost-effectively than their competitors, a double advantage we project to continue over the next ten years. The company creates and produces drugs for cystic fibrosis, pain, sickle cell disease, beta thalassemia, alpha-1 antitrypsin deficiency, APOL1-mediated kidney disease, Duchenne muscular dystrophy, type 1 diabetes and more.

Business Strategy

Vertex's approach involves the development of small molecule drugs that can be administered orally. Vertex initially concentrated on HIV/AIDS, but the company shifted focus to CF as its success in that area became more apparent. This foray into CF marked a strategic evolution for Vertex. The company continued to innovate and introduced several more CF drugs: Orkambi, Symdeko, and Trikafta. Trikafta, approved in 2019, represented a significant breakthrough by addressing the underlying cause of CF in over 90% of patients. Its Q3 2023 product revenue was $2.48 billion, a 6% increase compared to Q3 2022. Cost of sales as a percentage of net product revenue was 12% in 2022 and 2021, and is expected to remain in the same vicinity in the future.

Pipeline:

While Vertex invests in drugs other than those for CF, all revenue generation is currently due to their CF portfolio (see exhibit 1).

	2022	% of Total Revenue	2021	% of Total Revenue
TRIKAFTA/KAFTRIO	7686.8	86.1%	5,697.2	75.2%
SYMDEKO/SYMKEVI	180.0	2.0%	420.4	5.6%
ORKAMBI	510.7	5.7%	771.6	10.2%
KALYDECO	553.2	6.2%	684.2	9.0%
TOTAL	**8930.7**	–	**7574.4**	–

Exhibit 1: Revenue from CF Drug Portfolio as a percentage of Total

Industry Overview

Industry Trends:

- **Revolutionary Modalities:**
  Cell and gene therapies, as well as mRNA vaccine technology jumped to 21% from 11% of the drug development pipeline over the last two years. Drugs developed in these modalities comprise the fastest investment growth ever seen in the sector, and represent a seismic shift in the technology that will dominate the pharmaceutical industry over the next ten years and beyond. These modalities are qualitatively different from small-molecule drugs developed in the past, deriving more of their value from human capital and institutional expertise than expensive capital equipment. Because the capital barrier to entry will be lower, we predict that the industry will fragment over the next five to fifteen years. Further, diversification of supply chains brought about by new technological and raw materials requirements will have down-stream effects in supporting industries, evening out buyer and supplier power and thus increasing costs to pharmaceutical companies. Drug development under the coming paradigm will require lean, adaptive business models to support teams in varying stages of the new product life cycle.

  These changes will enormously benefit rational drug design companies at the expense of combinatorial chemistry. As the compounds produced increase in molecular weight and formal complexity, the number of permutations will become too large to successfully find treatments via the “shotgun” approach of combinatorial chemistry.

- **Increased Pricing Pressure:**
  In addition to the supply chain shifts noted above, the pharmaceutical industry will face increased pricing pressures over the next ten years from inflation, government price controls, and competition from generics. Inflation recently reached the highest levels recorded in the last two decades, currently declining from its peak of 8.2% in July of 2022. Monetary influences aside, a significant source of the inflation was supply chain disruption, particularly from China, which continues into the present and shows no clear resolution. These supply chain disruptions will increase costs for pharmaceutical companies across the industry, which source chemicals, biologic materials from china. In addition, the Inflation Reduction Act put drug pricing front and center again. Among other requirements, the IRA establishes a price negotiation process for buying certain drugs for Medicare beneficiaries, and redesigns Medicare Part D to provide less-expensive coverage to beneficiaries.

Competitive Landscape

Nearly all of Vertex's public competitors use combinatorial chemistry to develop new drugs, and are limited to its associated business model:

Combinatorial Chemistry	Rational Drug Design
Earlier Approaches: In the early stages of drug discovery, including the late 1980s and early 1990s, the industry relied more on combinatorial approaches. High-throughput screening of large compound libraries was a common method to identify potential drug candidates without necessarily understanding the detailed molecular mechanisms involved. Shift in Strategy: While combinatorial approaches may still have a role in certain areas of drug discovery, Vertex's shift towards rational drug design reflects a broader trend in the pharmaceutical industry. Advances in genomics, structural biology, and computational methods have allowed for a more targeted and rational approach to drug development.	In the case of Vertex, the success of drugs like Kalydeco, Orkambi, Symdeko, and Trikafta for cystic fibrosis is a testament to the effectiveness of rational drug design. By precisely targeting the genetic mutations associated with CF, Vertex has demonstrated the power of leveraging scientific understanding in drug development. This strategic choice aligns with the company's commitment to scientific innovation and a deep understanding of the diseases it aims to treat. Focus on Cystic Fibrosis: Vertex's journey into rational drug design is exemplified in its work on cystic fibrosis. Instead of relying solely on empirical approaches, Vertex utilized a deep understanding of the genetic and molecular basis of cystic fibrosis to design drugs that specifically target the underlying causes of the disease. Small Molecule Drugs: Vertex's approach involves the development of small molecule drugs that can be administered orally. By targeting specific proteins associated with cystic fibrosis, such as CFTR (Cystic Fibrosis Transmembrane Conductance Regulator), the rational drug design allows for the development of more targeted and potentially more effective therapies.

Exhibit 2: Combinatorial Chemistry vs. Rational Drug Design: Impact on Business Model

Inflation Reduction Act (IRA)

The Inflation Reduction Act (IRA) allows Medicare to negotiate lower prescription drug prices and limit price increases above inflation. The act grants Medicare authority to directly negotiate drug prices with biopharma and biotech companies. To be eligible for negotiation, drugs must be among the top of the list in terms of Medicare expenditure; lack any generic or biosimilar equivalents; and have already been on the market for a set number of years (7 for small molecules and 11 for biologics). Drugs that have orphan status, which are medications or medical products developed to treat rare diseases or conditions, may be exempt from negotiations. It mandates a 13-year protection period for biologics before implementing price controls and 9-years for small molecules. Biologics will thus be less affected by the IRA compared to small molecule drug development, meaning that small-molecule drugs will be disproportionately affected. The access and pricing of competitive branded drugs will be affected in a similar manner as when a generic drug hits the market, though probably not as much. According to an analysis done by BCG, the average small molecule's lifetime revenue will drop by 5% to 6% and that of biologics by 3% to 4%. Furthermore, certain therapeutic areas, such as oncology and metabolic disorders, that have proportionately more older patients are going to be more affected than others. Estimates of how many fewer drugs will be developed are wide-ranging. Pharmaceutical manufacturers may increasingly focus on developing more orphan drugs since they are not subject to negotiations, rather than follow-on indication approvals for serious illness and unmet needs, the result of which could be nontrivial.

Vertex's CF drugs are small molecule compounds. These types of drugs act at the molecular level to alter the effects of a genetic defect. They do not edit or impact the genetic information that causes CF, but they give the cell new instructions that can help it to override the bad instructions caused by specific genetic defects. One of its competitors for CF, AbbVie, is discontinuing all work in cystic fibrosis after a phase 2 issue and is also scrapping another phase 2 program in immunology. Therefore, Vertex also holds an economic moat in CF, making it difficult to directly contrast against its competitors.

Investment Thesis

Cost-Effective Rational Drug Design Will Outcompete Traditional Methods

Vertex Pharmaceuticals has been notable for its emphasis on rational drug design, particularly in the context of developing drugs for diseases like CF. Rational drug design involves using detailed knowledge of the biological target or disease process to design a drug that specifically interacts with the target, ideally with high selectivity and potency. This is in contrast to the traditional method of combinatorial drug design, which involves the screening of large libraries of compounds without necessarily detailed knowledge of the target. If mastered, rational design is far more efficient, as no time or capital is invested into compounds that lack a commercial justification. A rough estimate of cost effectiveness is displayed in Exhibit 3.

	Total R&D Expense 2022	Drugs Under Development	Average R&D Expense Per Drug
Gilead	4,977	41	121.4
Bristol Myers Squibb	10,324	64	161.3
Abbvie	7207	51	141.3
Merck	13548	93	145.7
Pfizer	12381	94	131.7
Vertex	**2,655.8**	**21**	**126.5**

Exhibit 3: Estimating Cost Effectiveness of Rational Drug Design (dollars in Millions)

Specialty in Chronic Illnesses: Cystic Fibrosis and Type-1 Diabetes

Vertex has placed a unique focus on treatments for chronic illnesses, enabling them to access a market with high barriers to entry and secured long-term cash flows. Vertex currently holds a near monopoly in the cystic fibrosis (CF) market, having developed top treatment options TRIKAFTA/KAFTRIO, KALYDEKO, SYMDEKO, and ORKAMBI. Vertex holds patents for these drugs in at least three developed countries, such as the United States or the United Kingdom. Further, the company has been blocking generics developed in other countries, particularly in the developing world; as the developing world generally has weaker pharmaceutical oversight and a reduced ability to impose regulation that holds up against pharmaceutical companies' legal challenges, Vertex will maintain and stands to grow its share of those markets. Combined with the fact that Vertex's competitors have not placed an equally heavy focus on CF, the company is well-positioned to reap the majority of gains from the expanding CF market, which is projected to grow to over $30 billion by 2030.

Another promising venture in the chronic-illness space is VX-880, a treatment for type-1 diabetes (T1D) under development by Vertex. T1D is a lifelong condition characterized by the autoimmune destruction of insulin production in the pancreas. This loss of insulin production impairs blood-glucose control, leading to, in severe cases, hypoglycemic episodes with life-threatening consequences. Approximately 1.6 million American adults have T1D, and 8.5 million globally; the US T1D market is expected to exceed $13 billion by 2030. Traditionally, T1D management revolves around the lifelong administration of exogenous (external) insulin. While this approach is lifesaving, it does not address the underlying autoimmune aspect of the disease, nor does it replicate the natural glucose-responsive insulin production of a healthy pancreas. The limitations and complexities of insulin therapy underscore the need for innovative treatments that can tackle the root cause of T1D, and it is in this context that Vertex Pharmaceuticals' investigational therapy VX-880 emerges. VX-880's treatment modality, focusing on stem-cell-derived, glucose-responsive cell therapy, presents significant growth potential for Vertex. Clinical data demonstrates the therapy's efficacy, as all patients treated with VX-880 showed improved glycemic control, endogenous insulin secretion, and a major reduction or elimination of exogenous insulin use. Furthermore, VX-880 has been shown to eliminate severe hypoglycemic events and cause insulin independence. These results underscore the impact VX-880 may have on T1D management. Therefore, provides Vertex with an economic moat. The therapy's unique mechanism of action and its ability to address the root cause of T1D set it apart from traditional insulin-based treatments. With the potential to offer insulin independence and improved glucose control, VX-880 can capture a significant share of the T1D treatment market. Although similar treatments do exist, Vertex's focus on rational drug design rather than computation chemistry sets them apart and indicates that VX-880 will be more cost-efficient than its peers. This innovation differentiates Vertex from competitors and offers significant growth potential.

Exa-cel's near term launch holds promising results as a potential one-time treatment for sickle cell disease and beta thalassemia

Sickle cell disease is caused by a genetic mutation making it a perfect candidate for CRISPR-mediated gene therapy. Dominant treatments in the sickle cell market are all targeted to manage effects of sickle cell disease. Exa-cel (Exagamglogene autotemcel) aims to edit a person's hematopoietic stem cells to produce fetal hemoglobin. This potential one-time treatment received positive interim results from trials of Exa-cel in SCD and TDT as of a September 2022 data cut. Both trials met the primary and key secondary endpoints at pre-specified interim analyses, and the data continue to demonstrate transformative, consistent and durable benefit. As a result, Exa-cel has been granted Fast Track, Regenerative Medicine Advanced Therapy (RMAT), Orphan Drug, and Rare Pediatric Disease designations in the US. The FDA also accepted the Biologics License Applications (BLAs) for Exa-cel and assigned Prescription Drug User Fee Act (PDUFA) action dates of December 8, 2023. With prospects of a possible cure to sickle cell disease and beta thalassemia for a disease dominated by managerial drugs, Exa-cell answers concerns of Vertex's dependence on CF.

Investment Risks

Patent Expirations and Pipeline Resiliency

Vertex's main business lines lie in cystic fibrosis, and its flagship drugs in the space will soon lose patent protection. KALYDECO is expected to expire in the EU by 2025, ORKAMBI is expected to expire in the EU by 2026, and SYMDEKO/SYMKEVI is expected to expire in the US by 2027. These markets comprise the majority of Vertex's revenue.

Mitigating Factors

As Vertex expands into the developing world and beyond the US, UK, and EU, its addressable market will grow. Furthermore, Vertex will continue to be able to block generic development in the developing world and as such will lose no strength in that area owing to weaker pharmaceutical regulation and reduced governmental hostility to pharmaceutical companies.

Inflation Reduction Act Harms Margins

The IRA allows Medicare to negotiate prescription drug prices and limit price increases above inflation, and average small molecule's lifetime revenue is expected to drop by 5% to 6% and that of biologics by 3% to 4%. Several of Vertex's drugs, such as

Mitigating Factors

TRIKAFTA has received the orphan-drug designation from the FDA, exempting it from the IRA's new drug pricing rules. As a result, revenue from TRIKAFTA, which comprise 75% of total revenue, will be unaffected. Furthermore, Exa-cel has also been designated an orphan drug; assuming that it receives FDA approval, which is indicated to be likely, then its pricing will be the prerogative of Vertex, not regulatory agencies.

Valuation

Assumptions

We project discounted cash flow over a longer time interval—from 2023 through 2030—to accurately describe the effects of patent expiries and the introduction of new drugs into the market. Revenue assumptions are modeled on a 35-45% revenue increase associated with major drug approvals as seen over the past five years, tapering down to a standard 2% terminal value. EBIT remains steady at about 50% of revenue, due to the cost-effective nature of rational drug design as argued in our theses, and supported by historicals over the past three years. We assume that depreciation and amortization are 2% of revenue from 2028 through 2030, which is higher than the prior five years, due to an increase in patented drugs on the market: Exa-cel and other pipeline drugs such as VX-880. Given the long time horizon and stable R&D costs, we believe that D&A will fluctuate around a 2% average. Additionally, we assume that capex targets at roughly 3% of revenue will hold for the next three to five years, but that capex will fall as a percentage of revenue in the aftermath of Exa-cel and VX-548 launches in 2026 and 2028, respectively. Finally, as patent-protection losses take their toll after 2029, we predict weakened revenue growth in subsequent years.

Exhibit 4.1: Cash Flow Projections

	Historical				Projected							
Year	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Revenue	4,160.70	6,202.80	7,573.40	8,930.70	10,448.92	14,106.04	17,632.55	21,511.71	26,244.29	35,429.79	52,790.39	65,987.98
Growth (%)	*36.52%*	*49.08%*	*22.10%*	*17.92%*	*17%*	*35%*	*25%*	*22%*	*22%*	*35.00%*	*49.00%*	*25.00%*
EBIT	1,202.00	3,054.00	3,892.30	4,378.40	5,224.46	7,053.02	8,816.28	10,755.86	13,122.14	17,714.89	26,395.19	32,993.99
% of Revenue	*29.00%*	*49.00%*	*51.00%*	*49.00%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*	*50%*
Effective Tax Rate	18.53%	14.94%	16.58%	27.41%	19%	19%	19%	19%	19%	19%	19%	19%
NOPAT	979.23	2,597.65	3,246.99	3,178.49	4,231.81	5,712.95	7,141.18	8,712.24	10,628.94	14,349.06	21,380.11	26,725.13
(+) D&A	106.9	109.5	125.6	148.3	209.59	272.51	318.16	389.84	483.68	708.60	1055.81	1319.76
% of Revenue	2.57%	1.77%	1.66%	1.66%	2.01%	1.93%	1.80%	1.81%	1.84%	2.00%	2.00%	2.00%
(-) Capex	75.4	259.8	235	204.7	303.56	392.15	458.45	559.30	691.66	921.17	1319.76	1649.70
% of Revenue	*1.81%*	*4.19%*	*3.10%*	*2.29%*	*2.91%*	*2.78%*	*2.60%*	*2.60%*	*2.64%*	*2.60%*	*2.50%*	*2.50%*
NWC	-180.00	-172.90	201.70	-10.60	182.87	444.05	770.53	1,168.84	1,654.77	2,310.78	3,288.23	4,510.05
Change in NWC	196.50	7.10	374.60	-212.30	193.47	261.18	326.48	398.31	485.93	656.01	977.45	1221.82
% of Revenue	*4.72%*	*0.11%*	*4.95%*	*-2.38%*	*1.85%*	*1.85%*	*1.85%*	*1.85%*	*1.85%*	*1.85%*	*1.85%*	*1.85%*
FCF	814.23	2,440.25	2,762.99	3,334.39	3,954.97	5,149.26	6,230.37	7,373.94	8,766.19	11,825.71	17,827.92	21,885.15
Discounted FCF					3595.43	4255.59	4680.97	5036.50	5443.11	6675.30	9148.54	10209.58

Equity:	
Risk-free Rate	4.57%
Equity Risk Premium	4.50%
Beta (Unlevered)	1.15
Beta (Levered)	1.27
Cost of Equity	10.29%
Percent Equity	95.27%
Debt:	
Cost of Debt	5.88%
%Debt	4.73%
WACC	10.08%

Exhibit 4.2: WACC Calculation

Terminal Growth Rate:	2.00%
Terminal Value	128934.96
Discounted Terminal Value	59814.36
Sum of Discounted Cash Flows	49045.03
Implied Enterprise Value	108859.38
Implied Equity Value	108091.78
Shares Outstanding	257.6
Implied Share Price	$419.61
Implied Upside	11.54%

Exhibit 4.3: Gordon Growth Valuation

		Terminal Growth Rate				
		1%	1.50%	2%	2.50%	3%
WACC	8%	50.13%	57.95%	67.08%	77.87%	90.81%
	9%	24.14%	29.31%	35.21%	42.03%	49.98%
	10.08%	3.66%	7.09%	10.95%	15.31%	20.30%
	11%	-9.59%	-7.11%	-4.34%	-1.26%	2.21%
	12%	-20.92%	-19.13%	-17.17%	-15.00%	-12.58%

Exhibit 4.4: Valuation Sensitivity

Company Name	Share Price	Shares Outstanding	Equity Value	PE (LTM)	EPS Growth	ROE	D/E	EV/Sales	EV/EBITDA	P/E
Vertex Pharmaceuticals Inc	379.64	258,094,815	97,983,115,567	29.07	1.67%	27.67%	2.61%	8.88	18.79	25.37
Gilead Sciences Inc	82	1,246,014,353	102,173,176,946	18.77	1.26%	21.60%	119.32%	4.44	9.32	12.09
Bristol Myers Squibb Co	51.39	2,034,757,742	104,566,200,361	13.4	-2.94%	18.91%	129.68%	2.98	7.06	6.75
Abbvie Inc	143.95	1,765,046,680	254,078,469,586	38.62	-18.88%	72.40%	24.90%	5.58	11.33	12.33
Merck & Co Inc	103.37	2,537,521,169	262,303,563,240	18.1	-106.68%	34.46%	84.52%	4.87	24.63	43.36
Pfizer Inc	30.9	5,645,959,570	174,460,150,713	17.09	-113.91%	36.22%	20.54%	2.95	11.7	12.89
Johnson & Johnson	151.21	2,407,278,620	364,004,600,130	28.34	20.38%	23.79%	42.01%	4.26	11.56	14.88
Sanofi SA	86.9	1,251,488,187	108,754,323,450	12.45	0.11%	11.77%	28.90%	2.8	8.54	10.71

Exhibit 5: Comparable Companies Analysis

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