promontory

Ipsum

Lorem Ipsum

investment research

Chewy

APD

IDEXX

Warby Parker

Winter 2022 Equity Report

Foreword

Promontory Investment Research is proud to present its 11th equity research report in print! Our Research Analysts have continued to deliver high-quality reports and we are thrilled to share their newest research with you.

Although the quarter initially began in a fully remote setting for two weeks, Promontory has unwaveringly maintained our tight-knit community while producing quality research reports. As a whole, our Research Analysts have delved into five companies from different industries. We have chosen the four best reports to publish: Chewy, Air Products & Chemicals, IDEXX Laboratories, and Warby Parker.

This quarter, we are especially proud to welcome one of our largest New Recruit classes since Promontory's founding. We have also reconstructed our flagship Basic Financial Training course to place a greater emphasis on active feedback and increased engagement between New Recruits and Research Analysts.

We look forward to the future with excitement as always. Although we are growing in number and campus presence, we will not lose sight of our mission to maintain a welcoming environment. We especially hope to foster a stronger sense of community between BFT classes and academic year levels through our continued mentor-mentee initiative. Among others, major initiatives we hope to accomplish in the near future include fundraising and philanthropy. We can only promise that there is still much more to come for Promontory and hope that you will continue to keep an eye out for us.

- Promontory Board

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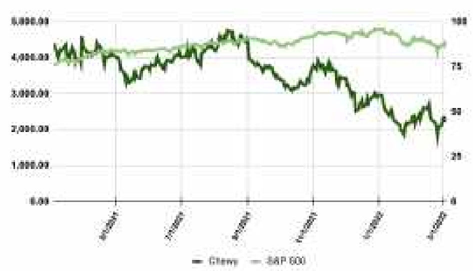
Chewy Inc. | NYSE: CHWY

Chewy Inc. | NYSE: CHWY	
Negative / **Neutral** / Positive	
Share price, 03/04/22:	$45.270
Market capitalization:	$18.92B
Shares outstanding:	418M
52-week range:	$97.74/$36.69
EPS (FY21)):	$0.03
Beta:	1.425
Average analyst opinion:	$65.5
Price target:	$46.1

Price Chart



Financial Highlights

(Dollars in millions)	2021	2022E	2023E
Revenue	7,146	9,647	12,059
% Growth	*47.45%*	*35%*	*25%*
EBITDA	-90.5	193	362
% Payout	*-1.07%*	*2%*	*3%*
Unlevered FCF	103.1	506.4	509.1
% Growth	*119%*	*391%*	*0.53%*

Research Analysts

Anay Mehta | anaymehta@uchicago.edu

Judy Guo | jmguo@uchicago.edu

Marcus Brotman | marcusbrotman@uchicago.edu

Gabriel Borsuk | gabrielbrosuk@uchicago.edu

Investment Overview

As an e-commerce company that focuses on pet product sales, Chewy benefits from industry tailwinds of growing recognition of pets as humans in addition to increasing pet ownership. Its growth strategy is three-fold: growing customer acquisition and spending per active customer, increasing product and service offerings and potentially expanding into international markets. In this report, we argue that Chewy's exemplary customer service and autoship program creates a sticky business model that effectively helps the company generate recurring revenue while its expansion into the pet health vertical with telehealth platforms diversifies its portfolio and allows it to increase profitability. Lastly, Chewy's focus on a vertical market as opposed to horizontal market gives it the ability to leverage economies of scale and offers it a competitive advantage against its largest competitor, Amazon. Nevertheless, we believe that Chewy faces significant challenges and uncertainties in the e-commerce space as an increasing number of retailers are expanding their online presence, taking market share away from Chewy. Upon further evaluation, we came upon the decision of a "**HOLD**" rating for Chewy.

Company Overview

Company History

Chewy Inc. is an e-commerce platform operating as Chewy.com and specializing in providing pet products, supplies, and prescriptions. As of September 2021, it has raised $451 million over 7 rounds of funding and has a market cap of $18.92 billion. It was acquired by PetSmart in 2017 for $3.35 billion, which was the largest e-commerce acquisition in history at the time. However, Chewy went public in 2019, with PetSmart remaining as a majority owner until 2021, where a refinancing transaction allowed Chewy to operate independently from PetSmart.

Revenue Model

Chewy has no brick-and-mortar stores and operates exclusively in the e-commerce space. Its revenue model consists of two streams - autoship customer sales and other non-autoship eCommerce sales. In 2020, **68.4% of Chewy's total revenue** was generated through its **Autoship subscription program**, where customers can set up recurring deliveries on products with no membership fees. Perks such as receiving 35% off on a first order, 5% to 10% off recurring orders, and free telehealth vet appointments give customers incentives to participate in this program. The remaining **31.6% of Chewy's revenue** comes from its **non-autoship sales**.

Chewy's business model emphasizes personalized customer service for its 20 million customers both through ensuring the availability of a wide assortment of products (2,500+ brands and 60,000+ products) for many widely held pets (dogs, cats, fish, birds, reptiles, rabbits, horses, etc), and through various programs and incentives such as sending customers portraits of their pets. In 2020, Chewy expanded its pet healthcare offerings by launching the telehealth service "Connect with a Vet" along with compounding medications that allow pet owners to order customized prescription medications. In addition, in 2022, Chewy is launching Practice Hub, an online pharmaceutical platform for veterinarians to order prescription medications for their clients. The introduction of these programs reflects Chewy's expansion of service offerings and entry into the pet health vertical.

Industry Overview

General Overview
The pet products and services industry is highly competitive and is expected to reach $54.95 billion by 2027, exhibiting a CAGR of 11.3%. This space is comprised of e-commerce only companies such as Chewy and Amazon as well as hybrid companies such as PetSmart and Petco that offer both online channels and brick-and-mortar stores. In recent years, online sales of pet products have been accelerating, taking up 30% of the total market in 2021 versus just 8% in 2015. This gives online-only platforms a competitive advantage over hybrid companies as their resources can be used to focus solely on developing the online segment, whereas hybrid companies need to maintain both an online presence and incur the costs associated with operating storefronts. In the online-only vertical, Amazon and Chewy dominate the market as they have 80% of the pet product e-commerce market share. This also places Chewy in direct competition with Amazon as both have developed efficient distribution channels and offer similar products. However, it is important to recognize that veterinary care, which largely requires in-person visits, is the second-largest vertical within the industry. This will be an increasingly important sector to watch as manny of Chewy's competitors will aim to gain market share in that respect.

Industry Tailwinds
In terms of what is driving growth in the industry, **rising consumer spending over e-commerce platforms** and the increase in internet users is fueling market growth. For instance, according to the U.S. Department of Commerce, consumers spent USD 601.75 billion online in 2019. Furthermore, 44% of the total North American population uses the internet. Promotional strategies, timely updates regarding the new products, and online deals have positively impacted the market in recent years. In fact, there has been a significant increase in the demand for pet care products due to the **shifting of pet owners from 'pet ownership' to 'pet parenting'** which in turn is fueling the pet care e-commerce market growth. There has also been a significant **increase in pet ownership** due to the pandemic. In 2020, pet ownership in the U.S. rose from 67% of households to an all-time high of 70%. As in the past few years, millennials comprised the largest segment of U.S. pet owners at 32%, up slightly from 31%, while the boomer and gen X owner segments both declined: from 29% to 27% and 26% to 24%, respectively. Rise in the adoption of pets worldwide is one of the factors positively influencing the market growth. The convenience to choose from websites which offer a wide range of products with detailed product description is fueling the growth. Moreover, discounts on different sites and increasing consumer preference to buy a product online is expected to propel revenue growth in the coming years.

Overall, the above factors are indicating strong tailwinds in pet ownership which will help Chewy. As a result, companies in the industry are adopting innovative strategies to gain a competitive edge over others. Personalized shopping, providing information pertinent to pet's behavior & illness, pet education content, multichannel access, and mobile apps have become an integral part of the online websites in recent years. It will be imperative to monitor whether big name players such as Amazon increasingly attempt to appropriate such strategies and implement them in their plans, which could cause Chewy serious problems in the long-run.

Industry Breakdown by Animal Type
The canine segment led the market and accounted for more than 47.0% share of the global revenue in 2019. Dogs are the most preferred and popular pets around the globe. An increase in the adoption rate of pets is expected to boost the demand for pet food, grooming products, toys, and other accessories and thereby online retail market growth in the coming years.

The feline segment is anticipated to expand at the fastest CAGR from 2020 to 2027. Cats are relatively low maintenance, require less training as compared to other companion animals, costs relatively less than dogs in the day-to-day, and veterinary care, along with being affectionate and self-reliant. These factors are expected to propel the segment growth over the forecast period.

Birdcage, cage liners, food and water bowl, etc. are in high demand for small animals such as birds. These products can be purchased irrespective of public holidays, weather conditions, and closing times. All these factors are anticipated to contribute to the market growth in near future.

Regional Breakdown
North America dominated the market for pet care e-commerce with a revenue share of over 37.50% in 2019. The region is followed by Europe, due to the increase in the number of companion animal adoptions, well-established e-commerce industry, and an increase in online orders. Moreover, the increasing government animal healthcare organizations and the rising initiatives to spread awareness for pet health are boosting the market investment by the manufacturers. On the other hand, the Asia Pacific market is expected to showcase lucrative growth in the next few years. Factors such as growing awareness and increased mobile adaptivity, tech-savvy owners, and high preference for online shopping are the factors driving the market growth.

Product Breakdown
The pet food segment accounted for the largest revenue share of around 40.0% in 2019 owing to high awareness regarding the diverse range of pet food and their nutritional status among owners. Availability of a wide range of products, user-friendly webpages, and superior quality food has made online buying more convenient. The product-wise catalog list along with discounted prices of various brands is available on the internet which has reduced the effort and the time required. These factors have added significant growth to the e-commerce market.

Investment Thesis

Thesis 1: Chewy's sticky business generates repeat sales and increased spending over time, driving organic revenue growth.

In the competitive e-commerce market, Chewy is able to outperform its competitors by creating a sticky business model that sees its customers returning over and over again and spending more and more over time. We can see this by diving into some statistics that were provided by the company in its S-1 filing to IPO in 2019. First, the *C3 (Customer Cohort Chart) Graph* (Exhibit 1) separates Chewy's customer base into cohorts by the year they first shopped at the website and shows the percentage of annual net sales that is attributable to each cohort over time. Each color represents a different cohort, and it is evident that all cohorts are flat to increasing over time. This means that the **growth in net sales per customer is more than offsetting customer churn**, pointing to the effectiveness of Chewy's customer acquisition strategy. From this graph, it can also be inferred that Chewy's existing customers effectively provide an embedded revenue growth of over 20% per year. Now, in order to determine how much of this increase in net sales is resulting from the increase in the number of customers per year and how much is resulting from the increased spending per customer per year, the *Net Sales Per Active Customer by Cohort* (Exhibit 2) graph can be examined. What can be seen is that **as the number of years a cohort exists increases, net sales per active customer in that cohort increases accordingly.** In particular, the average active customer in all cohorts is spending $503 in year 2, which increases to $711 by year 5. Combining the insights from the two graphs together, we can conclude that Chewy indeed has a sticky business model that not only allows it to generate repeat sales from its existing customers, but also increase the spending on those sales over time.

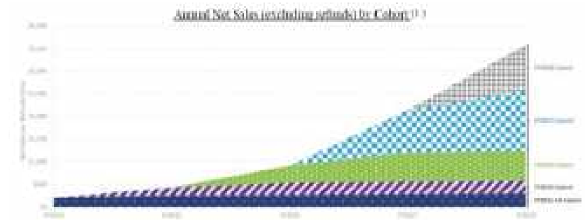


Exhibit 1: Chewy C3 Graph
(Chewy 2019 S1-filing)

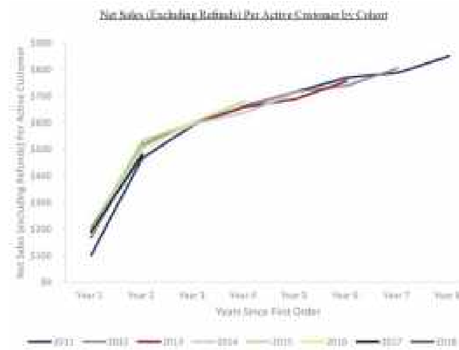


Exhibit 2: Net Sales/Active Customer per Cohort
(Chewy 2019 S1-filing)

To understand the drivers behind this sticky business model, we can looked to Chewy's adoption of a **service-first mission** where customer satisfaction is assigned the utmost importance. In order to make Chewy a "neighborhood store, but online", founder Ryan Cohen focused on bringing a human element to the e-commerce business. This translated to 24/7 customer service and small touches such as handwritten holiday cards and personalized pet portraits, which allows Chewy to connect with its customers, build **brand loyalty**, and create customer stickiness over time. By focusing on providing this kind of quality customer service, Chewy emphasizes what Amazon and other large pet product retailers have largely missed and plays into the industry trends of the increasing recognition of pets as a member of the family. This effectively gives it a competitive advantage over other retailers as most customers who shop at Chewy remain a customer at Chewy over long periods of time. Compounded with this sense of brand loyalty is Chewy's **autoship program**, which eliminates the friction of going on the website to re-order an already purchased item for customers and automatically generates repeat sales for Chewy. As this program currently makes up 68.4% of Chewy's current revenue, it means that at least 68.4% of Chewy's revenue is recurring, a further indication of the stickiness of its business model. In addition, the autoship program also allows Chewy to adopt more accurate sales forecasting, strategic inventory location, and competitive fulfillment costs as there are fewer split shipments, allowing it to cut costs and compete with players like Amazon that already have an efficient inventory and delivery system. From all the above, we can see that Chewy has the ability to generate significant organic growth from its sticky business model alone.

Thesis 2: High optionality and expansion into pet healthcare, insurance, and medicine

With Chewy's mission being to be the most trusted destination for all pet parents, they have begun to expand into other avenues apart from pet food such as pet healthcare, medicine, and insurance. These new offerings will allow **Chewy to further increase their average net sales per active** customer as mentioned in the previous thesis point because pet owners now have more reasons to spend money on Chewy's platform.

The company recently partnered with Trupanion, a leading medical insurance company for cats and dogs with over 600,000 pets enrolled in their service. The partnership will allow **Chewy to offer insurance plans for chronic conditions, illnesses, and accidents along with preventive care wellness plans**. With a large customer base of 20 million pet owners, this partnership will increase pet parents' access to affordable health care plans without having to worry about the time consuming process of researching, filing, tracking insurances separately for their pets. This partnership is important for Chewy because they will be able to access Trupanion's patented software, which pays veterinarians directly. This is just one example of Chewy enhancing their Healthcare ecosystem and the plans will be available for purchase in Spring 2022.

Exhibit 3: Consumer Expenditures
in Pet Products

Practice Hub is a new platform that Chewy is launching in 2022, which is an online pharmaceutical platform for veterinarians to order prescription medications for their clients. Chewy has the intention of making, selling, and purchasing pet medicine much easier as they will handle the inventory, fulfillment, and shipping of these medications. This allows Chewy to bring in another huge revenue stream and also gives their customers easier access to pet medicine. **As of September 2021, Chewy already had 8,000 partner clinics nationwide**, and since veterinarians can set prices, create pre-approved prescriptions, and earn revenue, it is a win-win for staff, clients, and pets. In terms of telehealth, Chewy is expanding its veterinarian telehealth services to all active customers instead of just their Autoship customers. **Now any active customer can pay per consultation to speak to a veterinarian** and Chewy will take a cut of this consultation fee for facilitating the connection.

Since these changes are forward-looking and require investment on Chewy's part, it is hard to tell how successful these plans will be. However, 15% of Chewy's customers use both retail and pharmacy products and the company has tripled their pharma revenue since IPO. These statistics prove that there is still room for growth in these areas and the increasing pet spending trend is a positive factor for this relationship (Exhibit 3). With these new offerings, **we expect revenue growth from Chewy's services outside of retail to grow by 80-90% in the next year**, which translates to their projected 35% overall revenue growth in 2022. These estimates are based on their pricing plans and current revenue breakdown. We also expect net sales per active customer to grow at a faster rate in the next year at 25% due to new revenue drivers formed by partnerships and new services.

Thesis 3: Chewy's vertical positioning provides economies of scale and allows it to have a competitive advantage over horizontal players.

Chewy controls 45% of online pet revenues, with the only significant competitor being Amazon, at 39%. There are two business models in competition, the verticality of Chewy, which is hyper focused on all pet related products, and Amazon's horizontal position, which seeks to sell most products. For the pet market, being a vertical player gives Chewy a competitive advantage over Amazon. Though Amazon sells more goods, Chewy offers a greater depth of products, which are more differentiated. On each firm's websites alone, Amazon's pet offerings are tucked into a small corner, where Chewy's page is bright and flashy, with near infinite options. Chewy has the ability to capture different pet niches, as their entire business is focused on the industry.

One of Amazon's main strengths is its complex and well coordinated logistical system. However, this is a negative for Amazon in this competition, as Chewy's sole focus on pet products, means that its logistics system is far less complex. It is hard to get exact data on their logistical costs. But, more complex logistics generally means a less stable, and more expensive delivery. An advantage on shipping costs leads to an advantage on product margins. These two factors, when combined with our previous theses about Chewy's sticky business model, and greater optionality implies that Chewy is in a superior competitive position than its only main competitor. Therefore, Chewy will continue to increase its market share, or at the very least maintain it.

Investment Risks

Risk #1 - Increased competition from retailers looking to expand their e-commerce presence.

Accelerated by the pandemic, an increasing number of pet product retailers such as PetSmart and PetCo are looking to expand their e-commerce business lines. Chewy will not only have to compete against current major online retailers such as Amazon by cutting costs and prices (especially delivery fees), but will also have to outperform new entrants in the roughly $100 billion U.S. pet products market. This is the largest threat facing Chewy as its entire business model relies on aggressive customer acquisition and retention. To this end, Chewy's sticky business model may not be enough, so in order to mitigate this threat, the company will need to find ways to increase customer steal and reduce customer churn. In a way, we believe that Chewy recognizes this threat and is thus racing to diversify its portfolio and enter into the pet health vertical. This not only allows it to create a one-stop-shop for its customers, removing the incentive for them to indulge in petcare spending elsewhere, but also allows Chewy to capture a larger market share.

Risk #2 - Decreasing autoship sales.

In the last year, Chewy's autoship sales as a percentage of revenue has decreased by around 1%, which is not extremely significant but may indicate a trend towards increasing non-autoship sales. As mentioned above, the autoship program is a key driver of Chewy's revenue as it ensures recurring purchases. As a result, the decrease in net sales from this program could be alarming. However, it is possible that this is due to an increase in Chewy's share of revenue from the new telehealth platforms that it implemented. In this context, Chewy's revenue structure could be shifting to reflect its investments into newer verticals.

Valuation

Assumptions

In Terms of revenue growth assumptions, we are predicting a higher revenue growth into 2022 and 2023 due to the new offerings and continued growth in pet expenditure. This is followed by moderate growth to maturity (18% growth) by 2026 as the customer and net sales per active customer start to slow down. We are predicting a positive EBIT margin and growing EBIT margin in the coming years as Chewy becomes a stronger vertical player and lowers their customer acquisition cost as they grow towards maturity. Additionally, Chewy posted their first quarterly profit at the end of 2021, so we are predicting this trend to continue in the future, reaching a profit margin of 6% by 2026. The Capital Expenditure and change in Net Working Capital assumptions are based on sell-side estimates and trends in previous years. With our Gordon Growth model, we arrived at an implied share price of $46.10 and an upside of 1.88%. When putting our valuation, investment thesis, and risks together, we come to the conclusion of rating Chewy as a **HOLD**.

	Historical				Projection				
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Revenue	2,104.30	3,532.80	4,846.70	7,146.30	9647.505	12059.38125	14471.2575	17365.509	20491.30062
% growth	-%	67.88%	37.19%	47.45%	35%	25%	20%	20%	18%
EBIT	-275.9	-267.8	-252.7	-90.5	192.9501	361.7814375	723.562875	868.27545	1229.478037
% margin	-13.11%	-7.58%	-5.21%	-1.27%	2%	3%	5%	5%	6%
Effective Tax	0.00%	0.00%	0.00%	0.00%	0.21	0.21	0.21	0.21	0.21
NOPAT	-275.9	-267.8	-252.7	-90.5	152.430579	285.8073356	571.6146713	685.9376055	971.2876494
D&A	9.5	17.9	22	28.3	28.42792046	28.55645888	28.68168592	28.80635838	28.93435741
%revenue	0.45%	0.51%	0.45%	0.40%	0.45%	0.45%	0.44%	0.43%	0.44%
CapEx	-40.3	-44.2	-48.6	-130.7	-132.6598207	-134.5111797	-136.4369466	-138.5365902	-140.568104
%revenue	-1.92%	-1.25%	-1.00%	-1.83%	-1.50%	-1.40%	-1.43%	-1.54%	-1.47%
NWC	-182.9	-453.7	-682.80	-717.40	-910.35	-970.65	-934.47	-1,108.12	-1,210.58
Change in NWC	-%	-270.8	-229.10	-34.60	-192.9501	-60.29690625	36.17814375	-173.65509	-102.4565031
change as % revenue	-%	-7.67%	-4.73%	-0.48%	-2.00%	-0.50%	0.25%	-1.00%	-0.50%
Unlevered FCF		65.1	47.00	103.10	506.4684201	509.1718805	700.55516	1026.935644	1243.246614
%growth		-	-27.80%	119.36%	391.24%	0.53%	37.59%	46.59%	21.06%
DCF					458.5063379	460.9537831	634.2132463	929.6858061	1125.512331

Exhibit 4: DCF MODEL

Beta	1.425
Risk-free Rate	1.91%
Market Return	8.00%
Equity Risk Premium	6.09%
Cost of Equity	10.59%
Pre-tax Cost of Debt	4.00%
After-tax Cost of Debt	2.60%
% of Debt	1.60%
% of Equity	98.40%
WACC	**10.46%**

Exhibit 5: WACC Calculations

Sum of FCF	3608.871504
Terminal Value	14988.60199
Enterprise Value	18597.4735
Implied Share Price	46.12057883
Current Share Price	45.27
Implied Upside	**1.88%**

Exhibit 6: Perpetuity Method

				WACC		
	46.12057883	9.46%	9.96%	10.46%	10.96%	11.46%
	1.25%	$47.04	$49.50	$49.50	$47.04	$42.90
	1.75%	$45.84	$48.16	$48.16	$45.84	$41.94
Terminal Growth	2.00%	$45.84	$48.16	$48.16	$45.84	$41.94
	2.25%	$47.04	$49.50	$49.50	$47.04	$42.90
	2.75%	$51.10	$54.11	$54.11	$51.10	$46.12

Exhibit 7: Sensitivity Analysis

Exchange Peers	Market Cap ($B)	Revenue (YoY)	P/S	P/E	EV/EBITDA	ROE	Gross Profit Margin
Etsy, Inc. (ETSY)	16.14B	61.75%	7.23	37.81	32.34	80.06%	73.25%
Wayfair Inc. (W)	13.39B	8.60%	0.93	145.55	37.26	-	28.87%
Petco Health and Wellness Company, Inc. (WOOF)	4.85B	19.01%	0.82	36.01	16.19	9.08%	42.09%
BARK, Inc. (BARK)	519.04M	49.15%	0.51	-	-	-50.89%	58.28%
Amazon.com, Inc (AMZN)	1.55T	21.70%	3.29	47.09	26.98	28.81%	42.03%
Walmart	396.17B	6.70%	0.7	23.88	14	15%	24.30%
Average		27.82%	2.25	58.068	25.354	16.41%	44.80%
Chewy, Inc. (CHWY)	18.46B	32.33%	2.15	1,694.80	372.3	225.86%	27.18%

Exhibit 8: Comparables Model

Winter 2022
Promontory Investment Research
https://www.promontoryir.com/

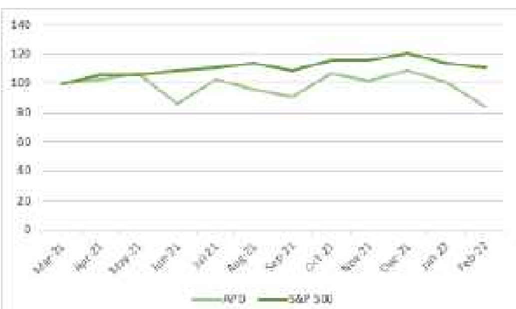
Air Products and Chemicals

Air Products and Chemicals, Inc. | NYSE: APD		
Negative	Neutral	**Positive**

Share price, 03/04/22:	$228.43
Market capitalization:	$50,647mm
Shares outstanding:	221.72mm
52-week range:	$316.39/$
EPS (FY21):	$9.47
Beta:	.89
Average analyst opinion:	$308.50
Price target:	$356.40

Price Chart

(normalized to $100 initial investment)



Financial Highlights

(Dollars in millions)	2021	2022E	2023E
Revenue	10323	11871	13652
% Growth	*17%*	*15%*	*15%*
EBITDA	2562	2623.59	2946.14
% Payout	*25%*	*26%*	*26%*
EPS	9.47	10.30	11.71

Research Analysts

Aneesh Bafna | aneeshbafna@uchicago.edu

Amman Kejela | akejela@uchicago.edu

Rohan Voddhi | rvoddhi@uchicago.edu

Investment Overview

Our analysis of Air Products and Chemicals, Inc. (NYSE: APD) has a positive outlook. Air Product's emerging market dominance, customer stickiness, and strong capital investment position the company well in the industrial gas supply industry. Our DCF has produced an implied upside of 45.48% and a target share price of $356.42, assuming a WACC of 5.8% and a terminal growth rate of 3.00%. Our comparable companies' analysis produced a target share price of $392.66.

Company Overview

Company History

Air Products and Chemicals (APD) was founded in 1940 in Detroit, Michigan. The company is a global provider of atmospheric, process, and specialty gasses. These gasses range from atmospherics such as oxygen and nitrogen to specialty gasses like helium and hydrogen. APD's sales are not tied to any one market and its products are used by manufacturers across sectors like agriculture, energy, electronics, etc.

Business Lines

The company's revenue is divided into the three following segments: on-site gasses, merchant gasses, and gas equipment sales.

Revenue Model, Value Drivers, and Outlook By Segment

On-site gasses consist of the sale of various gas products in large volumes to customers who have relatively stable gas needs. The product is usually provided by plants near customer facilities, or by plants built on the customer's facilities if for smaller quantities of gas. Revenue is recognized as the delivery of goods occurs. Such contracts are usually for a period of 15-20 years. This segment requires large upfront capex spending. Looking at the future project pipeline, on-site represents a large majority of planned projects. As APD increases the number of on-site contracts, the firm will see an increase in capex spending, while the income from the projects will only appear as top-line growth at a 5-7 year lag.

Gasses sold to customers in the merchant gasses segment are characterized by shorter, smaller contracts, typically under five years. Gasses are delivered to the customer in liquid form by tankers and vaporized on-site by equipment designed by the company. This segment is not as predictable, both in terms of customer needs and as a result of contract lengths. This makes up 40-45% of APD revenue. The small quantities per unit sold and minimal infrastructure required will make merchant gasses an increasingly important contributor to APD's net profit.

The equipment segment consists of the sale of manufactured equipment for use in purposes related to gas sales. These include air separation, hydrocarbon recovery and purification, natural gas liquefaction, liquid hydrogen/helium transport and storage. This makes up 5-10% of APD revenue.

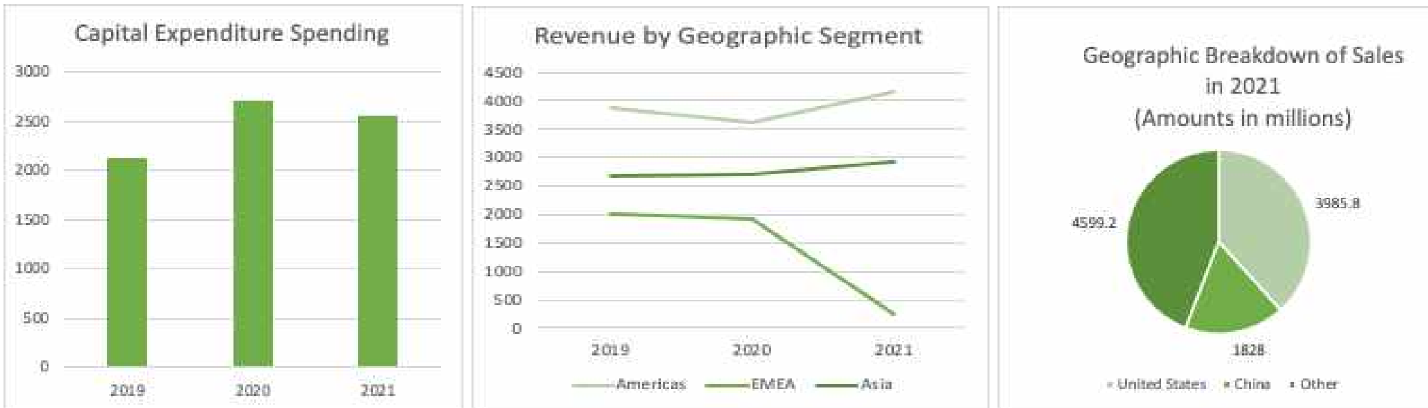


Exhibit 1: Selected financial data over the past three fiscal years

Industry Overview

Valuation

The global industrial gasses market is worth approximately $100 billion per year as of 2021 and is estimated to have a CAGR of 6.0% through the end of the decade, passing a valuation of $150 billion by 2030. APD offers a very stable business with the opportunity of exposure to growing areas such as hydrogen's use in energy and transportation, an area in which the company is already the largest producer.

Competitive Landscape

The industrial gas industry is effectively an oligopoly, with the three largest firms making up more than two-thirds of all revenues. Various characteristics of the industry support this as well.

There are three major factors that create significant barriers of entry in the industrial gas industry: high capital costs, geography, and the mission critical nature of gasses. On the first point, high capital costs result from the need of constructing major gas plants and infrastructure, meaning that the existing players are protected from new, smaller entrants. Secondly, geography acts as a barrier because transporting gas is expensive and difficult, making long-range transportation impractical. As a result, companies operate more localized plants for their customers. Finally, the mission critical nature of the gasses provided means that a disruption in supply could result in a complete stoppage in certain manufacturers or death of patients in hospitals that receive oxygen. This means that companies will generally opt to stick with their current gas providers as the risk of switching is high. All this combines to result in more customer stability for gas providers in the industrial gas industry.

Industry trends: headwinds and tailwinds

In terms of the industry's future, the growth in hydrogen as well as gasses in general will be a significant driver of growth for the industry. This is buoyed by the push for greener energy, which hydrogen can help provide. More broadly, the applications of gasses in healthcare and food and beverage industries is a contributing factor as well.

One potential tailwind for the industry is the need to reduce the carbon intensity and dirty nature of its gas production. Major industrial players are already making such pushes, but as governments and investors press for more reductions, this could cut into margins.

In general, we believe the outlook for both the industry and APD is positive as the gasses which it supplies are critical to its customers and are relatively stable due to long-term contracts. Additionally, the areas of the industry which are growing are also where APD's strengths and investments lie. This is particularly the case with hydrogen production. The biggest threat is the need to shift to greener production, but many of APD's investments reflect this, and if a premium cost point can be achieved, it can be offset in sales.

Major Competitors

The industry is composed of three major players. Besides APD, these are Air Linde and Air Liquide, two Europe-based global competitors. All three companies operate very similarly in terms of their distribution channels. They all have on-site, merchant, and packaged segments. Air Linde has a much higher percentage of their total revenue from merchant (including packaged) distributions, with this segment accounting for 68% of revenue compared to 50% for APD. Even though both are bigger, Air Liquide and Air Linde do not have as aggressive of an expansion plan as APD: they have no significant investments dedicated to expanding their geographic footprint, and they aren't investing in emerging markets like hydrogen power..

The threat of new entrants is unlikely in APD's industry as the barriers of entry are very high due to initial capital costs and geographic limits as outlined in the company overview. In the same way, it is difficult for competitors to steal market share from each other due to these limitations. Additionally, the long contracts in the industry make it difficult for competitors to gain ground.

Substitute products are impractical for consumers due to the mission critical nature of its products. Additionally, the fact that gasses generally make up a relatively small amount of customers' expenditures means that APD (and its competitors) have pricing power over their customers.

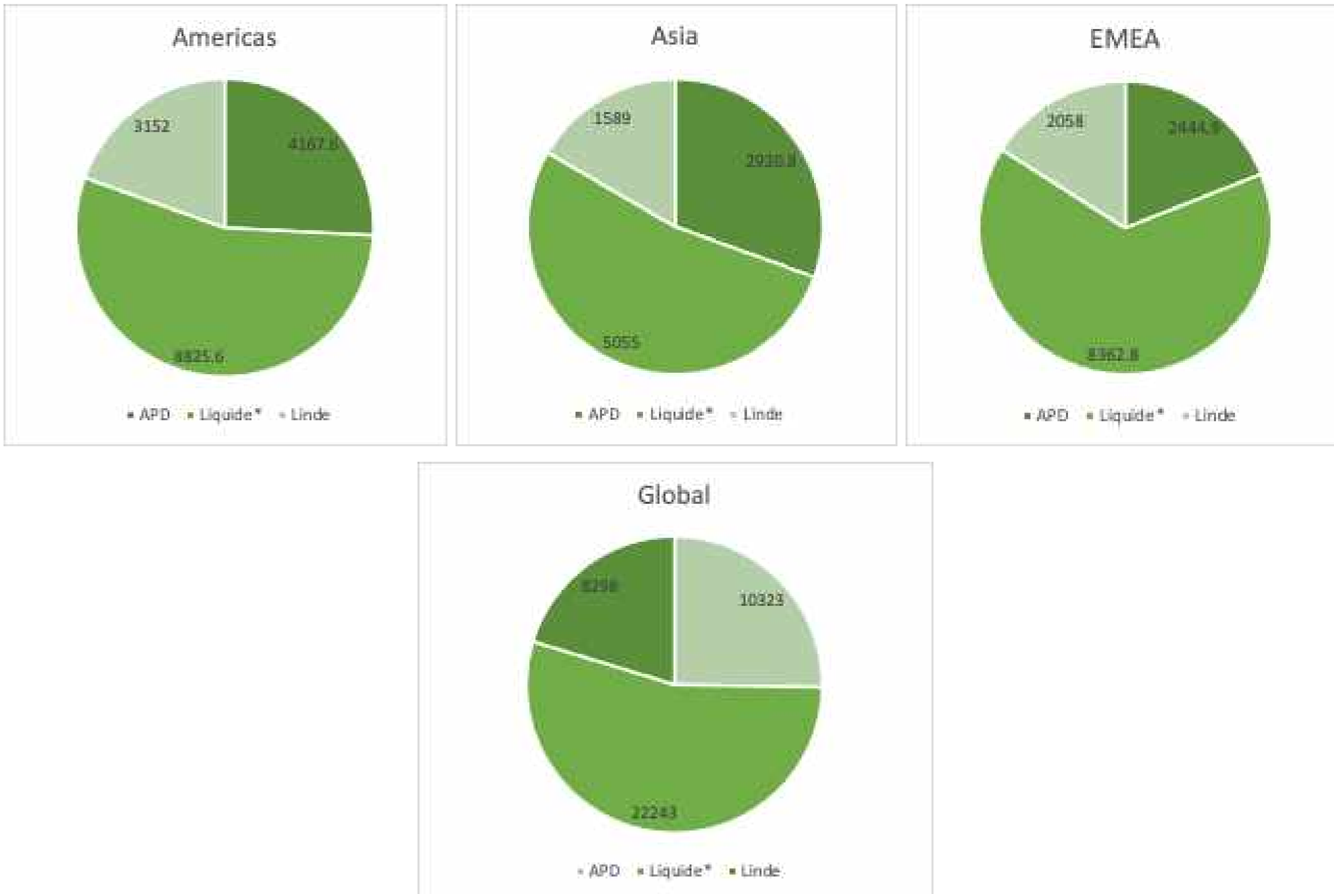


Exhibit 2: Revenue in each geographic segment by three main competitors (amounts in millions USD).

Investment Theses

Limited Competition Guarantees Value Capture from Market Growth

Most industrial gasses (with the exception of helium and certain carbon-based syngases) are produced through fractional distillation of liquid air. Using the same physical principles which power household refrigerators, massive liquifiers take in atmospheric air and liquify it; individual gasses can be separated by boiling the mixture to specific temperatures. The required size of liquifier-distillation apparatuses and electrical costs are expensive; what's prohibitive is the massive amounts of thermal insulation necessary to cool air to -195 degrees celsius. Once the desired gas has been produced, more capital equipment is necessary to transport it. The industry standard for transportation requires re-liquefying the pure gas, transporting it as a liquid, and re-vaporizing the gas onsite.

New entrants face high initial infrastructure costs and long time to recuperation along with a consumer landscape locked in to long contracts that make it difficult to gain new customers. All together, any entrant into the industry must pay for large air-capture infrastructure, liquefiers, distillation towers, high-pressure tanks to transport the gas, and small vaporizers to ship to the destination ahead of time.

Since competitors cannot steal market share from APD, and there aren't likely to be new entrants to the market, APD is guaranteed to capture value from the growth expected in the industrial gasses market. The industry is expected to be worth over $150 billion in revenue by 2023, and has a 6% compounded annual growth rate which is forecast to continue over the next two decades. APD is currently investing in a business strategy to capture growth in emerging markets, but the guaranteed capture of 25%-50% of industry growth over the next decade has not been noted by many analysts, and we believe it has not been appropriately priced into APD's value.

APD Alone Invests in Undervalued Hydrogen Market Growth

The second reason to believe APD is currently undervalued is the growth potential of the growing use of hydrogen. As the world's largest producer of hydrogen, APD is the undisputed market leader in hydrogen production. APD is also vertically integrated along the hydrogen-as-fuel value chain, including production, storage, transportation, and dispensing of hydrogen gas. APD's future business model is keyed to the growth of hydrogen-powered goods, particularly consumer cars. Hydrogen power is forecast to rise to 12% of global energy over the next thirty years, an enormous increase from which APD will capture most of the value. In particular, APD's network of hydrogen fueling stations positions it to uniquely benefit from the rise in hydrogen-powered cars: 28% of all hydrogen produced is forecast to be used to fuel cars by 2050. Significant future growth will also come from the use of hydrogen to power electricity generation: the first major US hydrogen power plant will be operational in 2023, and already has consumer contracts for 10 years of electricity; the EU is currently building hydrogen power plants with the goal of

producing 20% of all european electricity by 2050. Governmental and corporate pushes to wean off of fossil fuels will mean that green and blue hydrogen will only become more prevalent. The company plans to ramp up production of both green and blue hydrogen to meet future demand. Hydrogen can be produced by the air-distillation process described above, from water electrolysis, or from fossil fuels. APD plans to utilize its air-distillation infrastructure to ramp up production of "green hydrogen"-- hydrogen produced without fossil fuels, with limited production costs.
When hydrogen power becomes more prevalent, APD's key competitive advantage will be its domination of hydrogen transport apparatus: while competitors can eventually ramp up hydrogen production, they cannot easily replicate APD's distribution network, which includes over 250 hydrogen fueling stations and the longest hydrogen pipeline in the world.

Capex dedicated to breaking geographic barriers to expansion
Finally, APD's expansion strategy differs from that of Air Linde and Air Liquide. As mentioned above, the temperatures and pressures at which gasses must be contained limit the distance over which it can feasibly be shipped. The industrial gas conglomerates span the globe, but their operations are deeply parochial, requiring them to build whole new production plants any time they want to expand into new areas. APD's two competitors have exactly that model of production, distributing their gas products from regional hubs. APD on the other hand plans to create larger, centralized production facilities that will be able to produce hydrogen in the form of ammonia to allow for transportation and exportation rather than solely localized production. This will allow for greater flexibility and mobility in terms of selling and distributing hydrogen to different areas of the world, but most importantly, will allow APD to reduce production costs with an economy of scale which has so far been impossible. APD not only has a strategy to take market share from competitors, it is also more aggressive when looking at planned CapEx with respect to its overall size, meaning an overall larger growth potential. Air Liquide is investing $8B by 2035 in production infrastructure and has the goal to create 3GW of electrolytic capacity by 2030. For comparison, APD has made a $5 billion investment in an electrolysis project to generate 4GW by 2025.

Investment Risks

Risk 1: Hydrogen market fails to deliver forecast growth
The largest risk with APD is that the expected growth that should come from hydrogen production does not pan out. Blue and green hydrogen production are more costly than traditional hydrogen production, so for the foreseeable future, it will largely remain a premium product. If costs cannot be brought down over time through either technological advancements, scale, or government policy, it could prove less profitable than desired. APD's plan to create economies of scale to bring production costs down, especially costs of producing hydrogen, is a compelling mitigant.

Risk 2: Aggressive Growth spending leaves APD vulnerable to market risks
While the aggressive capital investment strategy offers more growth potential, it also means more risk. The large capital investment APD plans to make could prove costly, especially if long term hydrogen demand does not pan out. Stretched thin, APD's cash on hand will be lowered by reinvestment in the company until the planned expansion is complete, which limits APD's ability to meet a sudden market downturn or debt crisis. This risk is mitigated by the fact that APD is expanding its on-site segment, which will offer stable revenues and lower risk because of the long term contract revenue structure .

Valuation

DCF model:

Assumptions

The revenue predictions are linked to the expected completion dates of projects in the Air Products project pipeline. As a result, revenue increases at a rate of 15% in some years and 6% in others, with 6% representing standard growth at a rate of GDP and price increases and 15% representing projects coming online.

A terminal growth rate of 3% was taken because Air Products organically grows at a rate of GDP and has pricing power over its customers, leading to a 2% growth from GDP and 1% from price increases.

The company has commited $4.5-5 billion to Capex in 2022 and $30 billion from 2018-2028. Based on this, the capex assumptions are adjusted accordingly to fit this commitment.

Pro Forma Free Cash Flow Projections

Line Item	2018	2019	2020	2021		2022	2023	2024	2025	2026
Revenue	8930.20	8918.90	8856.30	10323.00		11871.45	13652.17	14471.30	15339.58	17640.51
% growth	–	0%	-1%	17%		15%	15%	6%	6%	15%
EBIT	2154.80	2385.20	2434.80	2562.00		2623.59	2946.14	3047.66	3150.75	3623.36
% margin	24%	27%	27%	25%		26%	26%	26%	26%	26%
Effective Tax Rate	20%	20%	20%	20%		20%	20%	20%	20%	20%
NOPAT	**1723.84**	**1908.16**	**1947.84**	**2049.60**		**2098.87**	**2356.91**	**2438.12**	**2520.60**	**2898.69**
(+) D&A	970.70	1082.80	1185.00	1321.00		1780.72	2320.87	2749.55	3221.31	3704.51
% revenue	11%	12%	13%	13%		15%	17%	19%	21%	21%
(-) Capex	1568.40	1989.70	2509.00	2464.20		4748.58	2866.96	3038.97	3221.31	3704.51
% revenue	18%	22%	28%	24%		40%	21%	21%	21%	21%
NWC	-265.40	-25.30	-40.10	16.70		–	–	–	–	–
(-) Change in NWC	–	240.10	-14.80	56.80		118.71	136.52	144.71	153.40	176.41
Change as % of revenue	–	3%	0%	1%		1%	1%	1%	1%	1%
Unlevered Free Cash Flow	–	761.16	638.64	849.60		-987.70	1674.30	2003.99	2367.20	2722.28
% growth	–	–	-16%	33%		-216%	-270%	20%	18%	15%
Discounted Cash Flow						-933.33	1495.04	1690.92	1887.45	2051.08

Weighted Average Cost of Capital

Current Share Price	$245.00
Shares Outstanding	222
Market Capitalization	$54,390.00
Total Debt	7,637.20
Cash & Cash Equivalents	5,800.80
Net Debt	1,836.40
Percent Equity	86%
Percent Debt	14%
Risk-Free Rate	2.00%
Beta	0.84328
Equity Risk Premium	5.20%
Cost of Equity	6.39%
Cost of Debt	3%
Tax Rate	20%
WACC	5.8%

Perpetuity Growth Rate

Terminal Growth Rate	3.0%
Terminal Value	99237.65432
Discounted Terminal Value	74769.59063
Sum of Discounted Cash Flows	6191.15
Implied Enterprise Value	80960.74
Implied Equity Value	79124.34
Fair Value per Share	356.4159579
Implied Premium (%)	45.48%

Exhibit 3: DCF MODEL

WACC vs. Perpetuity Growth Rate

45.5%	**5.1%**	**5.5%**	**5.83%**	**7.0%**	**7.5%**	**8.0%**
1.0%	4.15%	-6.04%	-13.06%	-31.92%	-37.82%	-42.84%
2.0%	36.43%	19.61%	8.56%	-19.19%	-27.34%	-34.08%
3.0%	99.44%	65.79%	45.48%	-0.10%	-12.19%	-21.82%
4.0%	277.02%	173.52%	122.85%	31.72%	11.60%	-3.43%
5.0%	4006.18%	712.22%	387.67%	95.36%	54.43%	27.23%

Exhibit 4: DCF Sensitivity Analysis

Comparable Companies analysis:

Given APD has few direct competitors, we compared APD with Air Linde and Air Liquide, in addition to large cap industrial chemical supply companies Dow Inc, Lyondell Bassel, and Formosa plastics corporation.

Metric	Air Products (APD)	Air Linde (LIN)	Air Liquide
P/E	30.01	46.56	26.3
Total Debt/Assets	28.43%	19.87%	29.5%
Net Debt	$3.1 B	$12 B	$13.5 B
P/CF	18.66	19.83	~30
Current Ratio	2.99	0.76	0.87
Market Cap	$63 B	$162 B	$85 B
Dividend Yield	2.12%	1.34%	1.90%

Exhibit 5: Comparing selected financial data with APDs competitors.

Exit Multiples Method

Exit Multiple (EV/EBITDA)	15x	Air Linde EV/EBITDA: 17	TWD: 23.1
Terminal Value (EV/EBITDA)	109918.0285	Air Liquide EV/EBITDA: 14.3	LYB: 10.4x
Discounted Terminal Value	82816.60877		Dow: 9.2x
Sum of Discounted Cash Flows	6191.15		
Implied Enterprise Value	89007.76		
Implied Equity Value	87171.36		
Fair Value per Share	392.6637873		
Implied Premium (%)	60.27%		

Exhibit 6: Exit multiples valuation

WACC vs. Exit Multiples

60.3%	***5.1%***	***5.5%***	***6.0%***	***5.83%***	***7.0%***	***7.5%***	***8.0%***
13	44.59%	42.02%	38.89%	39.97%	32.88%	30.01%	27.21%
14	55.09%	52.33%	48.95%	50.12%	42.49%	39.39%	36.38%
15	65.60%	62.63%	59.02%	60.27%	52.10%	48.78%	45.55%
16	76.11%	72.94%	69.09%	70.42%	61.70%	58.16%	54.72%
17	86.61%	83.25%	79.16%	80.57%	71.31%	67.54%	63.89%

Exhibit 7: Exit Multiples Sensitivity Analysis

IDEXX Laboratories (NASDAQ: IDXX)

IDEXX Laboratories | NASDAQ: IDXX		
Negative	Neutral	**Positive**

Share price, 3/4/22:	$535.71
Market capitalization:	$45.13B
Shares outstanding:	69.64M
52-week range:	$706.95/460.36
EPS (FY21):	$8.60
Beta:	0.94
Average analyst opinion:	$682.43
Price target:	$852

Price Chart

Financial Highlights

(Dollars in millions)	**2021**	**2022**	**2023**
Revenue	3125	4019	5104
% Growth	*%19*	*25%*	*27%*
EBIT	903	1004	1276
% of revenue	*-28%*	*25.0%*	*25%*
CapEX	293	402	459
% of revenue	*9%*	*10%*	*9%*
EV/EBITDA	10.3%	10.9%	10.7%

Research Analysts

Clara Ee | yingqi1302@uchicago.edu

Zubin Kumar | zkumar@uchicago.edu

Alejandro I. Morles | amorles@uchicago.edu

Sophia Wang | sophiawangt@uchicago.edu

Edward Wang | edwang314@uchicago.edu

Investment Overview

IDEXX Laboratories Inc. (NASDAQ: IDXX) is a competitive company in a rapidly growing industry. We recommend a Buy on IDXX with a price target of $812 because of potential for the creation of an ecosystem around its highly compelling products, its development of a wide variety of tests to combat surging viruses among animals, as well as its promising R&D department that is further bolstered by patent protection.

Yet, IDEXX's growth potential is potentially stymied by increases in pet vaccination rates, revenue sourced from competing sectors - where growth in one sector necessarily undermines growth in the other - as well as consolidation of their competitors and customers in the industry.

Company Overview

Company History
IDEXX Laboratories INC (NASDAQ: IDXX) is a multinational corporation specializing in veterinary and livestock diagnostic, as well as environmental testing. IDEXX was incorporated in 1983, and since has segmented its revenue into three primary sectors, Companion Animal Group (CAG), Water, and Livestock, Poultry and Dairy (LPD).

Companion Animal Group (CAG)
Companion Animal Group (CAG) is the largest segment, accounting for 88% of total revenue and encompassing a wide variety of both in-clinic and external laboratory consulting services. In-clinic sales arise from the distribution of medical testing units, which are key for fast and accurate diagnostics, as well as from the sales of their SNAP testing kits, which are more general diagnostic machines. IDEXX highly values their SNAP testing kit as a revolutionizing technology since this test is the first to utilize low sample diagnostic technology and have an integrated sample purifying mechanism, allowing clinics to test for a wider array of diseases at a faster rate. These tests allow smaller pet clinics to decrease their reliance on outsourced labs, which are more expensive compared to running an in-house test. Additionally, over the last two years, IDEXX has been marketing their ProCyte One as an essential lab testing device that can give an animal's complete blood cell count in under 5 minutes by using a device smaller than a desktop computer. Thus, IDEXX has innovated in both aspects of the CAG sector, finding ways to increase the power of the individual clinic while also bettering the technology of outsourced labs.

The CAG sector is currently IDEXX's only sector in which domestic revenue exceeds international revenue, and this has mostly been driven by increased veterinary spending in the United States. The recent trend of increased spending has mainly been attributed to the consumption trends of millennials and younger consumers. IDEXX has targeted the United States as a region for growth, not only because of this increased spending, but also due to the increased number of acquisitions of smaller veterinary clinics by larger pet conglomerates (ex. Petco acquiring multiple small clinics). This trend ultimately benefits IDEXX because they can sell diagnostic devices in larger quantities. However, this development may also decrease the reliance and need for outsourced clinics, which impacts part of IDEXX's revenue.

Water and Livestock, Poultry, and Dairy (LPD)

The Water segment and Livestock, Poultry, and Dairy (LPD) segment each account for 5% of IDEXX's total revenue. However, in both of these segments, international revenue exceeds that of domestic sales. IDEXX has primarily targeted growth in the water segments by creating new tests that screen for dangerous coliforms, such as E.Coli., and through governmental contracts. However, growth is expected to be slowest in this segment as it relies on governmental regulation in countries outside of the United States. In the LPD sector, IDEXX looks to market itself as a provider of rapid SNAP tests which can be used to detect whether livestock have damaging viruses, including Bovine Viral Diarrhea Virus and Swine Fever, and to screen dairy products.

Product Sources and Manufacturing

Many of IDEXX's instruments are manufactured by third parties and direct suppliers of raw materials, consumables, and important components for products. In some cases, these third parties are single source suppliers. Catalyst Dx and Catalyst One consumables, VetTest slides, VetlLyte consumables, LaserCyte Dx consumables, VetAutoread and ProCyte Dx analyzers and consumables, SediVue Dx urinalysis instruments and consumables, and components of internally manufactured analyzers rely on single source providers. Certain diagnostic imaging systems and some components used in SNAP rapid assay and dairy devices, livestock, and poultry testing kits, and water testing products are also from sole and single source suppliers. Single source suppliers could pose a supply risk since if something were to go wrong with the single source provider, IDEXX would have trouble getting its supply of products. VetTest and Catalyst chemistry slides are supplied by Ortho, and IDEXX is required to purchase all of their requirements from Ortho to the extent Ortho can supply them. Ortho, however, may not market these products in the veterinary market excluding the EU other than to IDEXX. The supply agreements will expire in December 2031, and this contract allows for product supply to be more stable and for Ortho to work more in alignment with IDEXX. Other analyzers and consumables are purchased under supply agreements with terms through 2034.

Recent Expansion into Cloud-Based Solutions

IDEXX has also grown through the strategic acquisitions of companies which have allowed them to strengthen their distribution and expand their R&D departments. Some notable acquisitions are listed below. These two acquisitions represent IDEXX's high prioritization of cloud-based veterinary diagnostics solutions as IDEXX is attempting to position itself as a leader of cloud-based vet Project Information Management System (PIMS) software. In 2021, IDEXX acquired ezyVet, a customizable veterinary software used for easier data management and optimization, and in 2012, Sneaker Software is used for electronic medical records.

Industry Overview

Veterinary Service Industry

The global veterinary services industry was valued at USD 97.34 billion in 2020 and has a forecasted CAGR of 5.7% over the next 5 years. The growth in this industry is expected to not only come from greater technological improvements in animal care, but also the global increase in animal adoption. Furthermore, there has been a similar increase in the investments made by pet owners on their pets over the last 5 years, which primes the industry for a near boom.

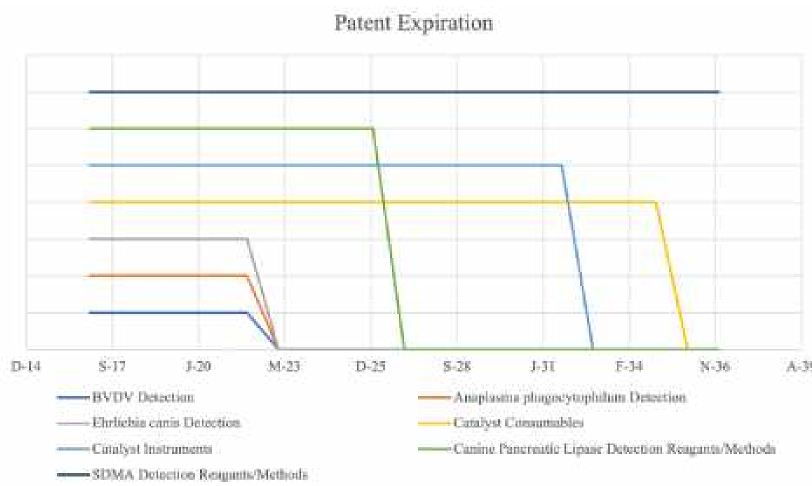
In particular, the global Veterinary Laboratory Testing Market is expected to grow to $16.9 billion by 2030, with an anticipated CAGR of 11.2% from 2022 to 2030. With about 39,966 independent operators, the Veterinary Laboratory Testing Services industry is highly fragmented, consisting of a few major industry players and multiple smaller firms serving niche submarkets. Major companies within the industry include Heska Corporation ($197.323M), ABAXIS, Inc. (insert data later), Neogen Corporation ($234.215M) as well as Zoetis ($3,145M). The majority of pet diagnosis companies, namely VCA Animal Hospitals, Banfield Pet Hospital, BluePearl, and Veterinary Speciality Hospital, are privately owned, and this makes it difficult to determine the market distribution between those large companies and individual providers. As all of IDEXX's revenue from the CAG sector is drawn from animal testing and diagnostics products and services, this is somewhat problematic for our analysis.

Tailwinds and Headwinds:

Various tailwinds contribute to the optimistic view on the CAG sector. During the COVID-19 pandemic, there was a surge of pet adoption in the United States, with an estimated ~6% increase in pet population in the US—where historically (2010 to 2019) that growth was only 1%. This trend is mirrored in other nations as well, notably Western Europe and Australia. This trend is not expected to result in a future contraction of the pet population where pet parents might surrender their pets. According to a survey of US, UK, and Canadian pet owners, 30% of pet parents state that they expect to adopt another pet, while only ~5% expect to surrender a pet.

Another notable tailwind in the strengthening of pet-parent bonds in recent years. Pet owners have been more caring to their pets in recent years and have been spending more money on their pets and pet care. The Gen Z demographic expresses the strongest affection, with around 80% of sampled Gen Z claim that they treat their pet "like it's their child." Pet owners also increasingly love their pets, want to take care of their pet's health as much as their own, and would adjust their budget to pay for veterinarian recommended care. As a result of this willingness to spend and an influx of pet patients, many clinics are increasing reliance on fast and accurate diagnostic systems which aim to increase the diagnosis to cure pipeline and make the process more efficient. Innovation in this field thus aims to both reduce the cost of the diagnosis, as well as decrease the amount of subsequent tests needed for an accurate diagnosis for a variety of diseases, from viral to bacterial infections. IDEXX's core innovation thus resonates with the industry as products such as the SNAP testing kit allow for clinics to diagnosis more pet diseases at a faster rate, while products such as the PyroCyte One are increasing the scope of pet diagnosis by increasing the number of testing parameters.

Furthermore, the increase in prevalence of animal-related diseases over time will fuel the demand for laboratory testing and animal healthcare needs. For instance, Zoonoses, which are diseases transmitted from vertebrate animals to humans, are responsible for a significant proportion of newly identified infections. This trend further favors IDEXX's position in the market as they invest in R&D, having spent $141,249 thousand on R&D recently, which allows them for the introduction of new products into this sub-market. Their established patents will also allow for an easier implementation of these new testing devices and create barriers to entry through intellectual property.



Investment Thesis

Compelling Products coupled with creation of an Ecosystem

With the introduction of compelling veterinary testing products into the market, as well as an integrated cloud-based system for data and imaging purposes, IDEXX will be able to create an ecosystem around its products.

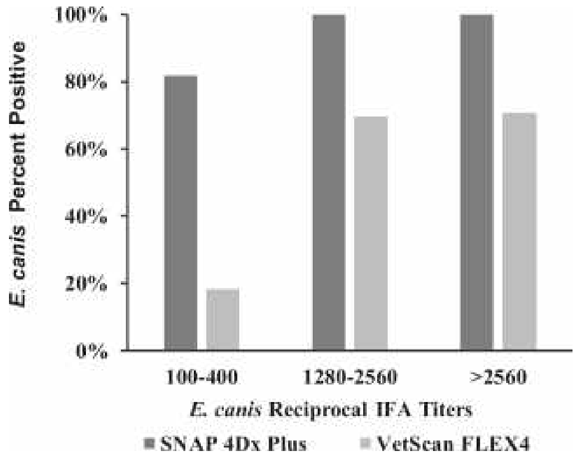
The increase in pet ownership means that veterinarians need the tools to diagnose animals at a faster rate. This aligns with IDEXX's view of growth in their CAG sector, as they are focusing on development of devices that will be able to diagnose animals in-house without needing external consultation. With tools such as the ProCyte One, IDEXX has and will continue to market itself as a technical solutions company which aims to give power to clinics to process and help more patients.

IDEXX is also supplementing the production of new testing devices with the marketing of their SNAP rapid assay testing kits, which is the current leading animal PCR test. As a result of the COVID-19 pandemic, PCR tests have become much more familiar and popular, and IDEXX plans to market these tests not only to veterinary professionals, but to pet owners as well. This campaign will help revenue growth given the projected increase in per-pet spending over the next decade, which is indicative of pet owners' growing willingness to invest in pet healthcare.

While common veterinary testing laboratory products such as Chemistry testing and Hematology are also being sold by major competitors Heska and Abaxis, IDEXX's strength is software development in the veterinary laboratory space since it has the potential to drive demand for its lab testing technology over its competitors. In particular, it is the only company that provides an Integrated Diagnostic Information Management system, which is a cloud-based technology used to integrate data from all its testing devices. By creating an ecosystem surrounding its testing products, IDEXX effectively increases its switching costs, which provides its company a strong competitive advantage.

Product/Company	**IDEXX**	**Heska**	**Abaxis(Recently purchased by Zoetis)**	**Zoetis (less relevant competitor)**
PCR Testing Technology	RealPCR Testing (Device) - Includes COVID-19 Real PCR test	No COVID-19 or PCR-related services found	No COVID-19 related devices or services found	No device sold; but PCRtesting service is provided
Multi-Panel Chemistry Testing (Blood Chemistry)	Catalyst One Chemistry Analyzer - **6 profiles** - **37 catalyst tests**	Element DC5X - **3 profiles**	Vs2 - **3 profiles**	VETSCAN VS2 chemistry analyzer - **1 profile**
Hematology	Yes	Yes	Yes	-No
Urinalysis	Yes	In development stage	Yes	-No

Cloud-based technology to integrate data from all testing devices (Increase switching costs by creating an ecosystem)	Integrated Diagnostic Information Management	Digital Radiography - Only provides software services for radiographs	No (Mainly focuses on screening)	-Early development stages



Positive test results (%) using FLEX4 vs SNAP FLEX4 for E. canis samples across various reciprocal indirect immunofluorescent antibody (IFA) titer ranges.

Promising R&D Departments Coupled with Patent Protection

The rapid expansion of IDEXX's R&D department, coupled with patent protection, would be crucial in allowing IDEXX to entrench its dominant market position. In R&D was 8.91%, 7.95%, and 8.90% of revenue for 2018, 2019, and 2020 respectively, indicating constant investment into research and development of new technologies. Healthcare companies grow from being able to deliver cutting edge products to their clients; thus, IDEXX's commitment to investing substantial funding into R&D shows their dedication to service innovation and their proprietary product.

The development of proprietary solutions that cannot be legally replicated by competing firms further strengthens IDEXX's market position. As such, they are able to enjoy an effective monopoly during the patent protection period, allowing them to both recover their R&D costs and generate supernormal profits (58.8 % gross profit percent of revenue in 2021). While competitors can sell their own multi-Panel Chemistry Testing, they cannot offer IDEXX's exact technology, which can test 6 different profiles. IDEXX uses a combination of patent, trade secret, copyright laws, and trademark to protect their proprietary products. While healthcare companies may boast similar technological capabilities to IDEXX, it is these protections that ensure IDEXX remains without a direct competitor. The majority of their patents began to expire and will continue into 2022, with a few notable exceptions lasting until 2032-2037. Even though a significant portion of their proprietary business is expiring, IDEXX is already taking steps to mitigate possible revenue loss. First, they already face competition in those fields where the patents are expiring. Furthermore, their heavy investment into R&D is done with the goal of discovering innovative product improvements; these improvements allow IDEXX to receive additional patents or discover a new technology altogether.

Investment Risks

Risk #1: Changes in Pet Vaccination

An increase in Pet Vaccination may pose a risk to the growth of IDEXX's rapid snap testing kits since it contributes to a decrease in the spread of common animal diseases. Although pets will still need to get tested, rapid testing kits will become less favorable as veterinarians will be able to get diagnostic results from more specialized devices. IDEXX highly values their rapid kits as a key growth asset, and if these devices begin to fall out of favor for veterinarians, this may stunt future revenue growth and cause a reactive increase in R&D. This risk is shown in the decrease of revenue in our bear case.

However, there has been no indication that there are major increases in vaccine rates. Furthermore, if these rates were to increase, it would take many years for veterinarians to change the methodology in which they purchase products enough to have an impact on IDEXX. In this time, we project that IDEXX will have already capitalized on a large part of the market and can take reactive measures, allowing them to not be as affected by this industry trend.

Risk #2: Revenue Stream from Competing Sectors

IDEXX is a major player in both the in-clinic and out-of-clinic markets within the CAG sector. However, these sectors inherently compete with each other. As IDEXX focuses more on in-clinic growth, this subvertical's overall growth will be stunted as they inherently hurt their out-of-clinic sales. This occurs because as IDEXX innovates in this space, they decrease the need for clinics to send samples to external labs, which can decrease revenue from this sector.Currently, IDEXX receives 60% of their revenue from the in-clinic products and 40% on out of clinic products, and IDEXX's heavy focus on growth in this sector may cause them to lose more of the out-of-clinic customers than gain in the in-clinic space. Furthermore, IDEXX may exhaust their customers in this space, which may inhibit long term growth. This risk is represented through the lower growth rate in the final year of our projection.

However, IDEXX has currently claimed that, although they see in-clinic as a large area of growth, they have no plans to shut down any of their external labs and halt consultations. Furthermore, IDEXX has continued to develop high-accuracy, specific analyzers that are primarily intended for out-of-clinic use. These developments represent IDEXX's understanding of their position in the market and the potential pitfalls of over-fixation on one sector.

Risk #3: Consolidation Fears

Consolidation in their competitors and customers threaten IDEXX's ability to be competitive. If hospitals continue to consolidate, each clinic would not need in-service testing—as they can use their own reference laboratory service instead—and they can negotiate better prices which will decrease profitability for IDEXX. Currently, Mars Incorporated owns Banfield Pet Hospitals, Blue Pearl Veterinary Partners, Pet Partners, and VCA Inc. Similar consolidation trends are being seen in Canada, Europe, and Brazil.

However, this risk is mitigated by a few positives. First, consolidation in their customers may allow IDEXX to negotiate larger bulk sales to corporate owners, leading to a higher total revenue even if revenue per unit is relatively lower. IDEXX can also remain extremely competitive if the corporate owners and their clients prioritize speed (i.e. in-clinic solutions) over profitability (i.e. central reference lab). Even if corporate owners shift towards central reference labs, they will still need testing solutions for orphan diseases (diseases that currently affect fewer than 200,000 organisms). As IDEXX continues to focus R&D on testing for these diseases, IDEXX may be able to sell these products regardless of the testing method.

Discussion of Previous Analysis

In 2020, previous Promontory Investment Research analysts created an in-depth review into IDEXX Laboratories and maintained a neutral position on the company. Their main investment points were IDEXX's strong R&D, their history of strong M&A, and their ability to grow internationally. Although this report reinforces the idea of IDEXX's investments into R&D, the previous report had focused more on cloud-based software and how this software can increase switching costs. In our report, we did not see IDEXX's R&D into cloud computing as a major investment point because IDEXX has chosen to focus their R&D into developing and advancing their testing capabilities. However, this report correctly identified that switching costs would greatly determine rapid growth in this space.

Regarding IDEXX's strong M&A, we no longer see this as a valuable investment thesis as we believe that M&A is an inconsistent revenue driver and we see IDEXX stopping their M&A in the future to focus on the development of their own technology. Since the report in 2020, there have been no major acquisitions in the company, and we do not expect to see a surge in M&A as IDEXX is not looking to expand into new areas of the veterinary lab industry.

Lastly, this report chose to focus on the domestic expansion of IDEXX, however the point on the international growth is not only well articulated, but applies to this report as well. For IDEXX to have consistent growth, they will need to either continually expand their product line, or expand into new markets, and although we have strongly valued IDEXX's ability to formulate new products through R&D, they are also able to expand into new global markets. Over the past year, IDEXX has installed devices such as the ProCyte One in over 70 countries worldwide and they have no intention to cease global expansion .

Valuation

DCF Assumptions

Base Case:

The rapid increase in the revenue corresponds to an increase in early-stage vet clinic adoptions of new in-clinic diagnostic machines. However, the revenue gradually slows down as clinics become more and more saturated with IDEXX products. This saturation will not fully hault revenue growth as IDEXX will still be able to market other products through its network effects. The initial rise in CapEX is attributed to a peak in production as there becomes a greater demand for these diagnostic products. Furthermore, this will slow more once facilities in production will become more established and the market saturates itself.

	Historical Period				Projection Period (Base)							
Line Item	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenue	2213242	2406908	2706655	3215360	4019200	5104384	6482568	7908733	9332304	8857780	9743559	10523043
% growth	-	*9%*	*12%*	*19%*	*25%*	*27%*	*27%*	*22%*	*18%*	*12%*	*10%*	*8%*
EBIT	457742	522218	661985	902654	1004800	1276096	1620642	1977183	2333076	2214445	2435890	2630761
% margin	*21%*	*22%*	*24%*	*28%*	*25%*	*25%*	*25%*	*25%*	*25%*	*25%*	*25%*	*25%*
Effective Tax Rate	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%
NOPAT	**361616**	**412552**	**522968**	**713097**	**793792**	**1008116**	**1280307**	**1561975**	**1843130**	**1749412**	**1924353**	**2078301**
(+) D&A	83178	88011	95998	104596	120576	204175	259303	316349	466615	442889	487178	526152
% revenue	*4%*	*4%*	*4%*	*3%*	*3%*	*4%*	*4%*	*4%*	*5%*	*5%*	*5%*	*5%*
(-) Capex	-138602	205528	109376	292967	401920	459395	518605	632699	746584	708622	487178	526152
% revenue	*-6%*	*9%*	*4%*	*9%*	*10%*	*9%*	*8%*	*8%*	*8%*	*8%*	*5%*	*5%*
NWC	-170532	-22390	213174	397063	-	-	-	-	-	-	-	-
(-) Change in NWC	-	148142	235564	183889	281344	357307	453780	553611	653261	620045	682049	736613
Change as % of revenue	-	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Unlevered Free Cash Flow	-	146893	274026	340837	231104	395590	567225	692014	909900	863634	1242304	1341688
% growth	-	-	*87%*	*24%*	*-32%*	*71%*	*43%*	*22%*	*31%*	*25%*	*44%*	*8%*
Discounted Cash Flow					224465	373189	519733	615859	786506	725069	1013023	1062637

Weighted Average Cost of Capital

Current Share Price	$538.71	3/4/22
Shares Outstanding	86,572	
Market Capitalization	$46,637,202	
Total Debt	$850,201	
Cash & Cash Equivalents	$144,454	
Net Debt	$705,747	
Percent Equity	5%	
Percent Debt	95%	
Interest Expense	29808	
Risk-Free Rate	1.93%	
Beta	1.05	
Equity Risk Premium	4.24%	
Cost of Equity	6.38%	
Cost of Debt	3.5%	
Tax Rate	21%	
WACC	3.0%	

Perpetuity Growth Rate

Base

Terminal Growth Rate	1.4%
Terminal Value	87345224
Discounted Terminal Value	69178726
Sum of Discounted Cash Flo	5320482
Implied Enterprise Value	74499208
Implied Equity Value	73793461
Fair Value per Share	852
Implied Premium (%)	58.23%

Bull Case:

The Bull Case assumes that IDEXX's revenue growth increases more because R&D has been more successful, able to net a stronger array of products. Furthermore, this case implies that international growth has expanded IDEXX's core customer base and that they will be able to capitalize more efficiently on a larger market.

Projection Period (Bull)							
2022	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
4019200	5224960	6792448	8830182	11037728	10596219	12185652	14013499
25%	30%	30%	30%	25%	20%	15%	15%
1004800	1306240	1698112	2207546	2759432	2649055	3046413	3503375
25%	25%	25%	25%	25%	25%	25%	25%
21%	21%	21%	21%	21%	21%	21%	21%
793792	**1031930**	**1341508**	**1743961**	**2179951**	**2092753**	**2406666**	**2767666**
120576	208998	271698	353207	551886	529811	609283	700675
3%	4%	4%	4%	5%	5%	5%	5%
401920	470246	611320	706415	772641	635773	609283	700675
10%	9%	9%	8%	7%	6%	5%	5%
-	-	-	-	-	-	-	-
281344	365747	475471	618113	772641	741735	852996	980945
7%	7%	7%	7%	7%	7.00%	7.00%	7.00%
231104	404934	526415	772641	1186556	1245056	1553671	1786721
0%	75%	30%	47%	54%	61%	25%	15%
224465	382004	482340	687614	1025644	1045295	1266924	1415110

Bull

Terminal Growth Rate	1.4%
Terminal Value	116317327
Discounted Terminal Value	92125065
Sum of Discounted Cash Flo	6529396
Implied Enterprise Value	98654461
Implied Equity Value	97948714
Fair Value per Share	1131
Implied Premium (%)	110.02%

Bear Case:

The Bear Case assumes that IDEXX will be unable to maintain a steady high growth rate. This may be because R&D has not netted new product lines and there have been industry trends which have pushed away veterinarians from valuing rapid testing kits. We expect that this could cause IDEXX to transition back into out-of-clinic growth and will thus grow with the CAGR of the industry.

Projection Period (Bear)							
2022	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
4019200	4823040	5546496	6212076	6833283	6709042	7178674	7609395
25%	20%	15%	12%	10%	8%	7%	6%
1004800	1205760	1386624	1553019	1708321	1677260	1794669	1902349
25%	25%	25%	25%	25%	25%	25%	25%
21%	21%	21%	21%	21%	21%	21%	21%
793792	**952550**	**1095433**	**1226885**	**1349573**	**1325036**	**1417788**	**1502856**
120576	192922	221860	248483	341664	335452	358934	380470
3%	4%	4%	4%	5%	5%	5%	5%
401920	385843	388255	372725	409997	402542	358934	380470
10%	8%	7%	6%	6%	6%	5%	5%
-	-	-	-	-	-	-	-
281344	337613	388255	434845	478330	469633	502507	532658
7%	7%	7%	7%	7%	7.00%	7.00%	7.00%
231104	422016	540783	667798	802911	788312	915281	970198
-32%	83%	28%	23%	20%	18%	16%	6%
224465	398118	495505	594308	694026	661833	746356	768411

Bear

Terminal Growth Rate	1.4%
Terminal Value	63160846
Discounted Terminal Value	50024336
Sum of Discounted Cash Flo	4583024
Implied Enterprise Value	54607360
Implied Equity Value	53901613
Fair Value per Share	623
Implied Premium (%)	15.58%

Sensitivity Analysis:

A sensitivity analysis was performed using weighted average cost of capital (WACC) and the terminal growth rate. This illustrates the partial volatility of the investment as the low WACC means that if there is a deviation from our model there may be a large deviation in the target price.

		Weighted Average Cost of Capital					
Terminal Growth	812.86	3.00%	3.40%	3.80%	4.20%	4.60%	5.00%
	1.00%	639.3925924	525.0351716	443.4770471	382.4153534	335.0152577	297.1759401
	1.50%	839.5953	653.2219286	531.822547	446.5162345	383.328456	334.6731234
	2.00%	1240.000715	872.970655	669.2488802	539.7538798	450.2236536	384.6693677
	2.50%	2441.216961	1336.884633	912.3877774	687.8371987	548.9737072	454.6641098

Comparable Companies Analysis

As IDEXX is a highly specialized company, there are few companies that are completely identical. As such, companies that share similar traits (functions, products, etc.) are identified instead. The value generated from the comparable companies analysis is lower than the value from the Discounted Cash Flow model, however, we attribute this to the lack of comparable companies in IDEXX's sector.

Heska: Animal lab testing & diagnostics services

Zoetis: Animal lab testing & diagnostics services

Labcorp: Clinical laboratory network; company essentially provides laboratory testing services for humans, rather than animals

Covetrus: Animal health products

Dentsply Sirona: Dental supplies company; key similarities: Both sell chiefly supplies to clinics by independent third-party distributors + significant spending on R&D

	Enterprise Value	Equity Value	Debt	Cash	EBITDA	Revenue	EV/EBITDA	EV/Revenue
IDEXX	-	-	850.20	144.45	1034.56	3215.36		
Heska	311.79	434.84	99.85	222.90	19.06	249.90	16.36	1.25
LabCorp	14238.80	10293.50	5418.00	1472.70	4047.70	16120.90	3.52	0.88
Zoetis	7647.00	4544.00	6600.00	3497.00	3207.00	7776.00	2.38	0.98
Covetrus	2365.00	1525.00	1027.00	187.00	158.00	4575.00	14.97	0.52
Dentsply Sirona	6922.00	5125.00	2081.00	284.00	1004.00	4245.00	6.89	1.63
Mean							8.83	1.05
IDEXX								
No. of shares	86.57							
EV/EBITDA	Enterprise Value	Implied Equity Value	Implied Share Price	EV/Revenue	Enterprise Value	Implied Equity Value	Implied Share Price	
8.83	9130.36	8424.61	97.31	1.05	3383.47	2677.72	30.93	

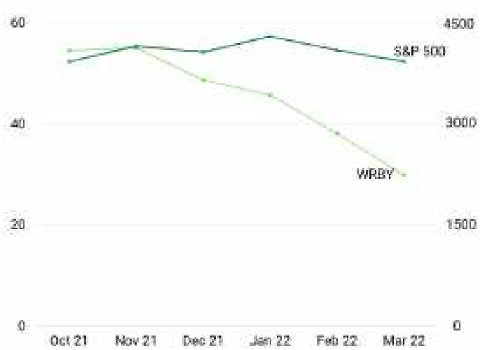
Exit Multiples Method

Exit Multiple (EV/EBITDA)	8.83x
Terminal Value (EV/EBITDA)	27875541
Discounted Terminal Value	22077846
Sum of Discounted Cash Flc	5320482
Implied Enterprise Value	27398328
Implied Equity Value	26692581
Fair Value per Share	308
Implied Premium (%)	-42.77%

Warby Parker, Inc. (NYSE: WRBY)

Warby Parker, Inc. | NYSE: WRBY	
Negative / **Neutral** / Positive	
Share price, 03/03/22:	$29.05
Market capitalization:	$2906.5mm
Shares outstanding:	113.2mm
52-week range:	$26.11/$60.30
EPS:	-$2.06
Beta:	N/A
Average analyst opinion:	Hold
Price target:	$74

Price Chart



Financial Highlights

(Non-percent values in millions)	**2019**	**2020**	**Q3 2021 (LTM)**
Revenue	$370.46	$393.72	$520.74
% Growth	*26.3%*	*5.9%*	*24.4%*
EBIT	-$1.66	-$55.63	-$67.38
% Margin	*-0.44%*	*-14.13%*	*-12.94%*
Active Customers	1.78	1.80	2.15

Research Analysts

Stella Chen | stellaqc@uchicago.edu

Rocco Fantini | roccofantini@uchicago.edu

Yangge Xu | yangexu@uchicago.edu

Investment Overview

Warby Parker, Inc. is a company that designs, manufactures, and retails eyewear products. The retailer offers myriad eyewear products, including eyeglasses, sunglasses, light-responsive lenses, blue-light filtering lenses, and contact lenses. Their brick-and-mortar locations—of which there are over 150—also offer eye exams and vision tests. Most of these locations are located in large metropolitan areas in and around cities like New York, Los Angeles, and Chicago. Nonetheless, Warby Parker is a direct-to-consumer, e-commerce business at its core, and is described by management as a "tech-enabled lifestyle brand." Although Warby Parker is currently an unprofitable company with negative earnings per share, we recommend a **HOLD** on its stock as we believe in the viability of its growth strategy, which relies on its founder-led team to turn Warby Parker into a holistic vision-care business, strengthen its quirky brand, and lower the customer acquisition costs currently weighing the firm down.

Company Overview

Company History

Founded in 2010 by four MBA students at Wharton Business School, Warby Parker initially set out to disrupt an eyewear market with near-monopolistic domination by Luxottica (now EssilorLuxottica SA). Originally, Warby Parker manufactured glasses through the same Chinese manufacturers used by Luxottica (while sourcing materials like acetate from Italy) to keep prices relatively low and function quasi-independently from the market's dominant player. In 2017, however, the company opened its first optical lab in Rockland County, New York, allowing for the in-house designing and manufacturing of frames (and in 2020, a second one was opened in Las Vegas, Nevada, to better serve West Coast customers). Through bypassing monopolistic middlemen and creating a vertically integrated supply chain, Warby Parker's savings could be translated into lower prices for consumers—ultimately leading to a more appealing product.

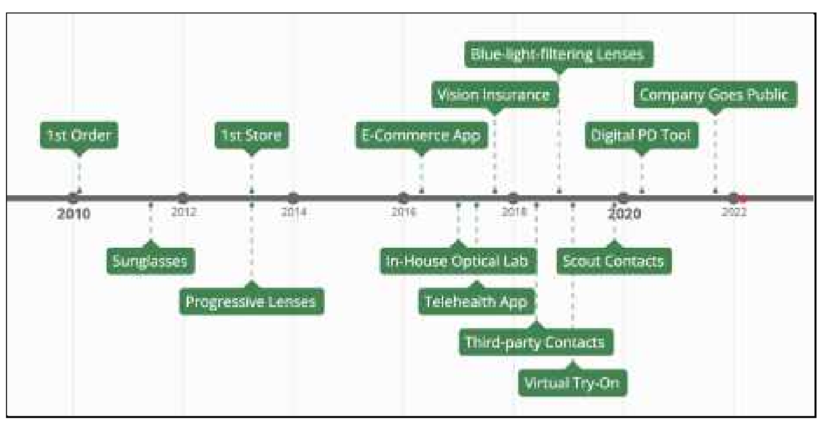


Exhibit 1: A Timeline of Key Points in Warby Parker's History
(from its founding to March 2022)

Value Proposition and Business Model

Warby Parker's current value proposition is the offering of stylish, high-quality frames starting at $95 dollars, delivering a more seamless experience and well-made product than budget competitors—at a price-point much lower than more established, luxury brands. The company's business model is, at the moment, largely centered around selling eyeglasses, with 50% of all 2021 sales coming via e-commerce channels with the rest coming via physical retail locations.In 2020, 95% of revenue was generated through eyeglasses—strong evidence of the nascent nature of the rest of Warby Parker's product offerings, whether it be contact lenses or eye exams. This is further evident by Warby Parker's incredibly low market penetration (outside of the company's overall 1% market share in the optical industry) on both the contact lens and progressive lens fronts, which make up a marginal percentage of Warby Parker's product mix. Warby Parker's timeline of product offerings demonstrates an increasing attempt to diversify what customers can shop at the retailer for. At the moment, though, the company's first-ever offering—eyeglasses—is still its primary offering.

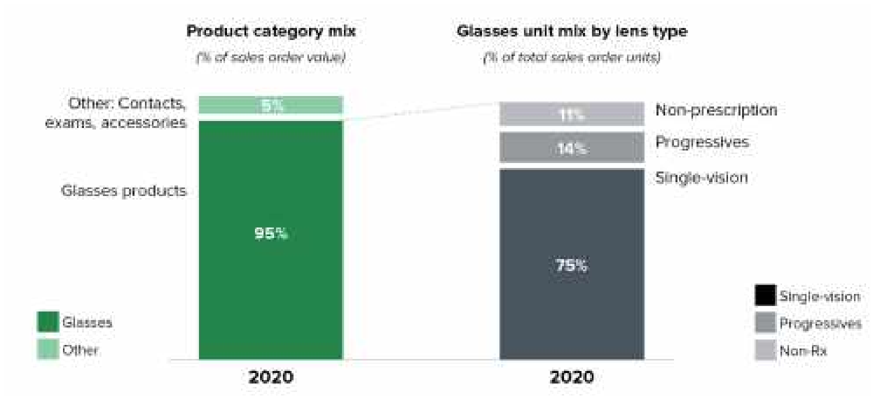


Exhibit 2: Warby Parker's Product and Lens Type Mixes

Cost Structure

As of Q3 2021 (on an LTM basis), Warby Parker has achieved a gross profit of over $306 million. However, its operating expenses are higher than said gross profit—in large part due to a high acquisition costs of $40 per customer, which make up nearly half of all SG&A costs. Accordingly, Warby Parker's current net unprofitability is a concern for any potential investor. To better illustrate the costs associated with the company's ongoing operations, the below diagram displays the cost allocation for each customer (in a channel-agnostic context).

Exhibit 3: Warby Parker's Cost Allocation Per Customer

Industry Overview

The eyewear market size was valued at USD 147.60 billion in 2020 and is expected to reach USD 157.98 billion in 2021. It has a CAGR of 8.5%. There is an increasing trend of globalization in recent years, particularly in Asian Pacific locations such as India and China. The main value driver behind the industry lies in two aspects: vision impairment and accessorial needs. On the vision impairment end, as digital products have increasingly become an integral part of contemporary society, a significant portion of Americans have vision issues and need glasses. According to an NIH study published in 2017, about 41.6 percent of Americans are nearsighted, up from 25 percent in 1971. With an aging population structure, glasses are also necessary for those over 60 as the situation of their eyes deteriorates. On the accessory end, glasses have become one of the most fashionable and crucial accessories in fashion books and on social media, leading many consumers to purchase glasses purely as a wardrobe addition. The two main segments of the industry are spectacles and contact lenses, with the former accounting for over 55% of the market share. Contact lenses, however, have been gaining more popularity when taking convenience and aesthetics into consideration.

Segmentation

There is a mix of physical and digital players within the industry. The former typically include large department stores such as Costco's and Walmart's optometric sections, and the latter include online platforms such EyeBuyDirect and sellers on Amazon. Within the two divisions, the market is very much segmented with firms focusing on niche customers. More specifically, the industry could be divided into three segments based on pricing: low-end, middle, and luxury. Zenni and EyeBuyDirect are examples of low-end eyewear brands, mostly focusing on convenience. Warby belongs in the second category with medium pricing and prioritizes quality and brand awareness. And the last category includes LensCrafters and Luxottica, which manufactures and imports lenses for brands such as LV, Tom Ford, and Gucci. The low-end and medium segments possess the greatest growth potential, as the pricing nature of the products allows more purchasing power from the consumers.

Exhibit 4: Highly Segmented Eyewear Industry

Low switching costs and little product differentiation

Due to a large number of players within the industry, consumers have many options to choose from. And since the glasses these firms offer are all the same, there is little product differentiation and the competition is fierce when it comes to retaining customers since they could easily go to another firm. Even as a late-comer in the industry, Warby Parker has positioned itself strategically as an affordable fashion brand that directly sells to consumers without a prescription. Even though there isn't a prescription/optometric component built-in, Warby Parker essentially serves as the one-stop shop after the prescription. Warby offers an at-home lens try-on with free shipping and easy orderings/returns, which differentiates itself from the traditional Costco and Walmart eyewear section. Additionally, as an e-commerce business, Warby Parker spends a considerable amount of revenue on advertising. Most of its campaigns focus on the fashionability, sustainability, and affordability of glasses, uniquely building a distinct reputation.

New e-commerce business models

Even though the brick-and-approach still dominated the industry with a market share of 79% in 2020, the digital eyewear platform has been gaining momentum with a growth rate of 3% for the past few years. The digital B2C approach not only cuts down COGs and SG&A but also allows more personalization. Many traditional eyewear retailers have been expanding their digital presence. Warby Parker has been the industry leader in digital B2C eyewear. Warby Parker has a warehouse in New York and outsources the manufacture to China. Compared to Luixcotta, Warby Parker has found success through disintermediation by designing frames in-house to avoid license fees and taxes, working directly with suppliers, and transferring value to consumers. By targeting customers accurately through social media and allocating a significant amount of money towards digital advertising, it is able to gain attention from younger consumers seeking cheaper, more convenient options.

Technological innovations

Lens innovation within the industry is rare and capital-exhaustive, mostly because the machinery needed is imported from Milan. As of right now, Luxottica controls most of the new technology and other firms don't have the necessary capital for R&D. However, if a firm is able to develop or acquire technology that directly scans a human eye with a mobile phone or cheap device at home, that could be proven to be a huge advantage in terms of attracting customers.

Investment Thesis

Thesis Point 1: Increasing brand awareness driven by high customer retention rate and satisfaction rate as well as sustainable long-term customer acquisition strategy for the future.

As a brand that started off primarily with digital presence, Warby Parker has been extremely careful in constructing its brand story in order to maximize customer retention rate. One of the most important aspects of DTC retail is to convert the audience into customers, which means how effectively a brand is able to turn the audience that it is advertised to into consumers who pay for the product–Warby Parker is able to do that consistently, converting about 3% of its audience into customers. Warby Parker also has an immensely loyal customer base, reaching a retention rate of about 100%. The main reason for this is that Warby Parker has been building a high switching cost for its customers albeit the fact that the eyewear market traditionally has a low switching cost. There are mainly two components to a switching cost in the eyewear industry: financial cost and experience. With regard to financial cost, Warby Parker's lenses are almost half of the price compared to that of traditional retailers, therefore levering the switching cost. On the experience side, there is some friction in the time needed for the glasses to be delivered, however, Warby Parker compensates for that by providing excellent customer service–their net promoter score is 91, which accentuates how satisfied their customers are. In order to acquire more customers, Warby Parker is seeking to expand their “holistic vision offering”, a pipeline of eye exams, glasses, contacts, and glasses. Furthermore, Warby Parker has been opening more physical stores to acquire new customers. Within these physical stores, there are certified optometrist prescribing for the patients, dispelling doubts of the accuracy of online prescription. Even though it has only opened 140 brick-and-mortar locations, the sales split evenly between offline and online avenues, the former averaging $2,900 per square foot annually. The physical stores serve as marketing points for consumers to learn more about and trust the brand. Warby Parker plans to open 40 more stores around the U.S in the next year, driving more growth while still maintaining the online customer base.

Thesis Point 2: In a fragmented industry, Warby Parker has carved out a path to become the sole cost-friendly, one-stop-shop for vision care.

Although Warby Parker initially began as a glasses-only retailer in 2010, their scope of vision care offerings has significantly expanded since then. The company’s first telehealth program launched in 2017, soon followed by its innovative Virtual Vision Test in 2019—a year which also saw Warby Parker release its first made-in-house contact lenses. 99 of the retailer’s nearly 150 physical locations also offer eye exams. These business decisions actively create a foundation for Warby Parker to capitalize on their ambition to become what it calls a “holistic vision care company,” which internal data show to attract stickier customers over time (specifically, customers who purchase the full gamut of glasses, contacts, and eye exams lead to cumulative average order values 2.2x higher than those who only buy glasses).

Exhibit 5: Cumulative Average Sales Order Value Per Customer (Plotted Over Time)

In becoming a one-stop shop for customers to receive eye exams, glasses, and contact lenses, Warby Parker appears keen to differentiate itself from the rest of the optical industry, where there is currently no DTC brand where customers can inexpensively purchase all their vision care needs. In the pursuit of profitability, this long-term strategy will not only result in more glass-wearing customers, but more importantly, will grow the number of what the company calls “holistic vision customers,” which currently only make ½ of 1% of its total customer base, ultimately leading to the aforementioned sticky customer relationships. As Warby Parker begins to penetrate the $5.1 billion contacts market (which is only 1% of its business) and the $5.1 billion eye exam market (which, again, is only 1% of Warby Parker’s business), it will be able to leverage its consumer goodwill to raise more revenue from each customer to a significant degree, while reaching more customers to begin with.

Thesis Point 3: Founder-led management maintains and bolsters Warby Parker’s quirky, innovative culture amidst a stagnant industry.

Warby Parker’s co-founders and co-CEOs—Neil Blumenthal and Dave Gilboa—have scaled Warby Parker from a late-night-conversation idea they had as Wharton students to the growing optical industry disruptor it is today. They have underscored the company’s quirky brand every step of the way, such as in crafting the “Warby Parker” name by combining the names of two Jack Kerouac characters, rather than having a name centered around the low-cost nature of their product, as was the case with many competitors. Per their own words, Blumenthal and Gilboa seek to “inject fun and quirkiness” into every aspect of Warby Parker’s operations, from entertainingly-written job postings to centering employee recognition around the company’s unofficial “Blue-Footed Booby” mascot. The evidence points to this culture bolstering employee satisfaction. In comparison to data from the U.S. Bureau of Labor Statistics, Warby Parker has consistently maintained a competitive employee retention rate of over 65% since 2016. On Glassdoor, an employee rating website, Warby Parker has 4 stars out of 5—significantly higher than the average company rating of 3⅓, with myriad reviews raving about a “fun” and “inclusive” company culture. These early investments in establishing a positive, innovative company culture are key to securing a future of sustainable growth for Warby Parker, attracting and retaining the necessary talent to further penetrate the still-nascent online eyewear industry and expand into markets for progressive lenses and contacts, while furthering the company’s telehealth initiatives in ultimately building a one-stop shop for all vision care needs.

The expected benefits of Warby Parker’s continued founder-led management are supported by mounting evidence demonstrating elevated growth from such companies. According to the Harvard Business Review, companies with “the founder’s mentality,” like Warby Parker, consistently display concrete advantages in performance. For example, an index of founder-led companies in the S&P 500 performed 3.1 times better than the rest between 1990 and 2014. Moreover, Bain &

Company analyses shows that businesses led by founders exhibit "the founder's mentality," consisting of three main practices: (1) business insurgency, wherein founders engender a sense of purpose for the company, which bolsters employee engagement and creativity; (2) a front-line obsession, where a love for company culture and front-line operations prevents a business from becoming a fragmented, out-of-touch bureaucracy; (3) and, finally, an owner's mindset, encouraging companies to take risks. Blumenthal and Gilboa's leadership of Warby Parker reflects all three elements of "the founder's mentality." The phenomenon of business insurgency is reflected in how Warby Parker employees cite the company's mission-driven, social-good-oriented nature as their primary reason for working there. Blumenthal, Gilboa, and other members of company leadership frequently take shifts to speak on the phone with customers or showcase eyewear at physical retail locations—illustrating a consistent front-line obsession. One can even see a strong sense of an owner's mindset at Warby Parker, with the company's co-founder CEOs accepting full responsibility for establishing the business as a B-corporation and taking on the risks associated with balancing profitability with social responsibility.

We believe that, in the long-run, Warby Parker will be able to reap from these benefits. Although anecdotal, interviews with former Warby Parker employees give us confidence in believing that the "quirky, bring your whole self to work" culture emphasized by its founders is alive and well at the company, with individuals leaving the company only to immediately return after missing its environment—with the brand created by Blunenthal and Gilboa acting as a "north star" for all that the company does. In an optical industry dominated by monopolistic competition begetting stagnancy in innovation, there is wide opportunity for Warby Parker's management to continue spearheading the company down a path of creating a technologically-advanced, seamless, and feel-good vision-care experience for all—whether they're buying glasses, contacts, eye exams, or all those offerings at once. From what we've seen so far, it seems that they'll take full advantage of it.

Investment Risks

Risk #1: Warby Parker has high customer acquisition costs which would stop it from turning profitable.

Warby Parker has never achieved profitability even with increases in customer base, retail stores, and revenue. In 2020, the company lost $55.9 million on $393.7 million in revenues and during the first six months in 2021, the company lost $7.3 million on $270.5 million.

High advertising expenses are the most important factor that prevents Warby Parker from profiting. Warby Parker has spent $43.4 million and $58.5 million on advertising respectively in 2019 and 2020. Its CAC has increased by 49%, from $27 per customer in 2019 to $40 per customer in 2020. Even though $40 does not seem a lot compared to the average CAC in the industry, as Forbes stated, Warby Parker innovatively applies their costs against all "active customers", and not just newly acquired ones. This means the costs to acquire new customers (traditionally the definition of CAC), should be significantly higher. Given the increasing active customers and retention rate, Warby Parker has definitely benefited from its digital advertisements on Facebook and Google. However, as the online eyewear industry scales, Warby Parker needs to spend more on those digital ads to acquire new customers to survive in the competitive industry. Moreover, on core Facebook, CPMs rose 47% in Q3 2021 compared to Q3 2020 and +33% versus Q3 2019. The increasing unit cost of advertising will definitely drag Warby Parker from achieving profitability even further.

Risk #2: Larger competitors of Warby Parker have advantages over Warby Parker in all aspects.

Through advertising efforts, Warby Parker is now a household name for buying glasses online. However, WP maintains a small share of the eyewear market. As mentioned in Industry Overview, the US eyewear industry is also highly fragmented with many small-sized companies. Warby Parker, as one of those private companies, only holds 1% of the market share, which is almost negligible compared to its larger competitors such as Vision Source, Luxottica, National Vision, Walmart Vision, Costco Vision, VisionWorks, and more.

Those larger and more profitable competitors have a distinct advantage over Warby Parker - they tend to have more retail stores than Warby Parker and thus more profits. Hence, they can move into e-commerce more easily and cheaply than Warby Parker can expand its physical retail presence. Moreover, Warby Parker's Home Try-On offering is not a proprietary service and likely would have already been replicated if it is proved to be effective. The other online eyewear website and one of the most direct competitors of Warby Parker, Zenni Optical, already offers a "Virtual Try-On" that allows customers to upload pictures of themselves to see what they look like in the glasses.

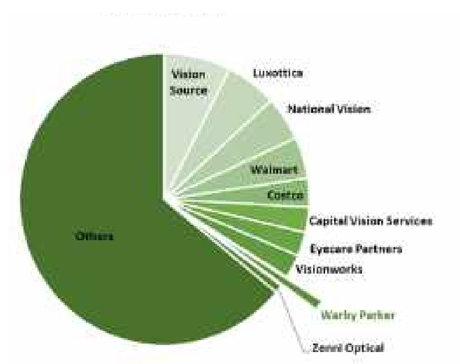


Exhibit 6: Market Shares of Main Players in the Eyewear Industry

Risk #3: E-commerce in the eyewear industry has not achieved success as expected.

Warby Parker's initial focus on e-commerce-based eyewear may be considered innovative in 2010, but this concept hasn't lived up to the success e-commerce has seen in other industries. Consumers, especially those who wear prescription lenses, still prefer to shop for their glasses in person rather than online – e-commerce sales in the eyewear industry grew by just 4% compounded annually compared to an 18% growth for overall e-commerce retail sales over the past 5 years. In 2021, online sales of eyewear accounted for just 4% of total US eyeglass sales. Thus, we think that Warby Parker is struggling to justify its expected valuation.

Valuations

Warby Parker calculates its customer acquisition cost (CAC) through the following: ***total media spend*** + ***Home Try-On costs*** divided by ***active customers***. The below forecasts used for our intrinsic valuation of Warby Parker heavily depend on continued decreases in CAC (resulting from a mix of higher customer counts and fewer marketing and shipping costs) throughout the decade.

As an important note: a conservative bear case would produce little-to-no change in CAC (and therefore SG&A) as a percentage of sales, leave Warby Parker as an unprofitable company, and produce a negative fair value per share. Therefore, this report only contains intrinsic valuations for bull and base cases, wherein Warby Parker achieves profitability and reaches a positive fair enterprise value. The optimistic nature of these assumptions informs our overall neutral attitude toward Warby Parker's stock from a conservative investor's standpoint.

Intrinsic Valuation (Base Case**)**

Assumptions

Warby Parker will moderately penetrate the markets for progressive lenses and contact lenses to a moderate degree, and their increase in retail locations coupled with the maintenance of an extremely high NPS will spur word-of-mouth awareness that'll strengthen the company's brand, lower CAC, and subsequently significantly lower SG&A as we near the end of the decade. Further assumptions include:

- "Holistic Vision Customers" (who purchase glasses, contacts, and receive eye exams) will increase from ½ of 1% to 15% of Warby Parker's customer base.
- Increases in both customer counts and average order volumes (AOVs) will lead to sustained year-over-year revenue growth of over 20%, in line with the company's own current forecasts.
- An decrease in CAC by 50% will decrease SG&A as a percentage of revenue by nearly 25%.
- COGS will decrease as a result of innovation and efficiency in optical labs compounded by a higher product mix of higher-margin sales, such as those of progressive lenses. Specifically, as a percentage of revenue, COGS will have gone down by nearly 25% (thereby boosting Warby Parker's gross margins by around 10%).
- D&A as a percentage of revenue will slightly increase by around 1% due to a higher number of physical retail locations (with a projection of, at the very least, doubling the number of such locations over the next half-decade to over 300 stores).

Discounted Cash Flow Valuation and Sensitivity Analysis

	Historical Period (in thousands, except for percentages)			Projection Period (in thousands, except for percentages)								
Line Item	**2019**	**2020**	(LTM) **2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Revenue	$370,463	$393,719	$520,740	$624,888	$756,114	$914,899	$1,107,027	$1,350,573	$1,647,699	$1,993,716	$2,412,397	$2,894,876
% growth	35.74%	6.28%	32.26%	20.00%	21.00%	21.00%	21.00%	22.00%	22.00%	21.00%	21.00%	20.00%
Gross Profit	$223,093	$231,940	$306,664	$374,933	$468,791	$585,535	$719,568	$918,390	$1,136,913	$1,375,664	$1,688,678	$2,026,413
% margin	60.22%	58.91%	58.89%	60.00%	62.00%	64.00%	65.00%	68.00%	69.00%	69.00%	70.00%	70.00%
SG&A (including CAC)	$220,671	$282,667	$368,740	$443,670	$529,280	$649,578	$752,779	$864,367	$988,620	$1,116,481	$1,230,322	$1,331,643
as a % of sales	59.57%	71.79%	70.81%	71.00%	70.00%	71.00%	68.00%	64.00%	60.00%	56.00%	51.00%	46.00%
EBIT	-$1,663	-$55,631	-$52,074	-$62,489	-$60,489	-$91,490	-$33,211	$27,011	$82,385	$119,623	$168,868	$231,590
% margin	-0.4%	-14.1%	-10.0%	-10%	-8%	-10%	-3%	2%	5%	6%	7%	8%
Effective Tax Rate	0%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%
NOPAT	-$1,663	-$55,631	-$53,940	-$63,010	-$61,497	-$66,186	-$23,449	$21,339	$65,084	$94,502	$133,406	$182,956
(+) D&A	$4,100	$4,900	$5,300	$6,249	$7,561	$12,351	$16,605	$23,635	$28,835	$35,887	$44,629	$57,898
% revenue	1.11%	1.24%	1.02%	1.00%	1.00%	1.35%	1.50%	1.75%	1.75%	1.80%	1.85%	2.00%
(-) CapEx	$32,632	$20,070	$39,340	$49,991	$64,270	$80,054	$99,632	$128,304	$164,770	$204,356	$253,302	$303,962
% of revenue	8.81%	5.10%	7.55%	8.00%	8.50%	8.75%	9.00%	9.50%	10.00%	10.25%	10.50%	10.50%
NWC	-$39,610.00	-$59,480	$131,877	$256,855	$370,272	$416,017	$382,806	$247,749	$66,502	-$152,807	-$442,295	-$789,680
(-) Change in NWC		-$19,870	$191,357	$124,978	$113,417	$45,745	-$33,211	-$135,057	-$181,247	-$219,309	-$289,488	-$347,385
as % of revenue		-5.05%	36.75%	20%	15%	5%	-3%	-10%	-11%	-11%	-12%	-12%
Unlevered Free Cash Flow		-$50,931	-$279,337	-$231,730	-$231,623	-$179,633	-$73,265	$51,727	$110,396	$145,342	$214,221	$284,277
% growth		N/A	448.46%	-17.04%	-0.05%	-22.45%	-59.21%	-170.60%	113.42%	31.66%	47.39%	32.70%
Discounted Cash Flow				-$217,530	-$204,106	-$148,593	-$56,892	$37,705	$75,540	$93,358	$129,170	$160,909

(continued on next page)

Weighted Average Cost of Capital (WACC)	
Current Share Price (03/04)	$26.20
Shares Outstanding	113,200
Market Capitalization	$2,965,840
Total Debt	$168,010
Cash and Cash Equivalents	$266,240
Net Debt	-$98,230
Percent Equity	94.64%
Percent Debt	5.36%
Risk-Free Rate	1.97%
Beta	0.95
Equity Risk Premium	5.17%
Cost of Equity	6.88%
Cost of Debt	0.36%
Tax Rate	21.00%
WACC	6.53%

Perpetuity Growth Rate	
Terminal Growth Rate	2.00%
Terminal Value	$6,404,220
Discounted Terminal Value	$3,402,842
Sum of Discounted Cash Flows	-$130,439
Implied Enterprise Value	$3,272,403
Implied Equity Value	$3,370,633
Fair Value Per Share	$30
Implied Premium (%)	12.01%

Weighted Average Cost of Capital (WACC) vs. Perpetuity Growth Rate							
	6.5%	*7.0%*	*7.5%*	*8.0%*	*8.5%*	*9.0%*	*9.5%*
1.6%	4.6%	-10.4%	-26.6%	-44.1%	-63.0%	-83.5%	-105.5%
1.8%	8.7%	-6.0%	-22.0%	-39.3%	-57.9%	-78.1%	-99.8%
2.0%	12.0%	-1.7%	-17.4%	-34.4%	-52.8%	-72.7%	-94.1%
2.2%	16.9%	2.6%	-12.9%	-29.6%	-47.7%	-67.3%	-88.5%
2.4%	20.9%	6.9%	-8.4%	-24.9%	-42.7%	-62.0%	-82.8%

Intrinsic Valuation (Bull Case**):**

Assumptions

Warby Parker is able to successfully penetrate the markets for progressive lenses and contact lenses, becoming a true one-stop shop for all things vision-care. Naturally, this will significantly increase average revenue per customer—while, at the same time, boosting the overall number of customers as variables like NPS continue to drive consumer awareness of Warby Parker. Aiding in this will be a sustained advantage in the company's retention rates, which are currently at nearly 100% over a four-year period. Should management lead Warby Parker down this path, we forecast the following:

- "Holistic Vision Customers"will increase from ½ of 1% to 20% of Warby Parker's customer base.
- Increases in both customer counts and average order volumes (AOVs) will lead to sustained year-over-year revenue growth of over 20% in the near term and 25% at the end of the decade..
- An decrease in CAC by 75% will decrease SG&A as a percentage of revenue by nearly 40%.
- COGS will decrease as a result of innovation and efficiency in optical labs compounded by a higher product mix of higher-margin sales, such as those of progressive lenses. Specifically, as a percentage of revenue, COGS will have gone down by nearly 25% (thereby boosting Warby Parker's gross margins by around 10%).
- D&A as a percentage of revenue will increase by around 2% due to the maintenance of a greater number of physical retail locations (with a projection of reaching nearly 500 stores across the U.S. by the end of the decade).

Discounted Cash Flow Valuation and Sensitivity Analysis

Historical Period (in thousands, except for percentages)				**Projection Period** (in thousands, except for percentages)								
Line Item	**2019**	**2020**	(LTM) **2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Revenue	$370,463	$393,719	$520,740	$624,888	$756,114	$914,899	$1,107,027	$1,350,573	$1,674,711	$2,085,015	$2,606,269	$3,257,836
% growth	35.74%	6.28%	32.26%	20.00%	21.00%	21.00%	21.00%	22.00%	24.00%	24.50%	25.00%	25.00%
Gross Profit	$223,093	$231,940	$306,664	$374,933	$468,791	$585,535	$719,568	$918,390	$1,155,550	$1,438,660	$1,824,388	$2,280,485
% margin	60.22%	58.91%	58.89%	60.00%	62.00%	64.00%	65.00%	68.00%	69.00%	69.00%	70.00%	70.00%
SG&A (including CAC)	$220,671	$282,667	$368,740	$443,670	$529,280	$612,982	$697,427	$742,815	$820,608	$917,407	$984,319	$1,042,507
as a % of sales	59.57%	71.79%	70.81%	71.00%	70.00%	67.00%	63.00%	55.00%	49.00%	44.00%	37.00%	32.00%
EBIT	-$1,663	-$55,631	-$52,074	-$62,489	-$60,489	-$45,745	$11,070	$40,517	$117,230	$250,202	$443,066	$684,146
% margin	-0.4%	-14.1%	-10.0%	-10%	-8%	-5%	1%	3%	7%	12%	17%	21%
Effective Tax Rate	0%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%
NOPAT	-$1,663	-$55,631	-$53,940	-$63,010	-$61,497	-$66,186	-$23,449	$32,009	$92,612	$197,659	$350,022	$540,475
(+) D&A	$4,100	$4,900	$5,300	$6,249	$7,561	$12,351	$16,605	$23,635	$29,307	$37,530	$48,216	$65,157
% revenue	1.11%	1.24%	1.02%	1.00%	1.00%	1.35%	1.50%	1.75%	1.75%	1.80%	1.85%	2.00%
(-) CapEx	$32,632	$20,070	$39,340	$49,991	$64,270	$80,054	$99,632	$128,304	$167,471	$213,714	$273,658	$342,073
% of revenue	8.81%	5.10%	7.55%	8.00%	8.50%	8.75%	9.00%	9.50%	10.00%	10.25%	10.50%	10.50%
NWC	-$39,610.00	-$59,480	$131,877	$256,855	$370,272	$416,017	$382,806	$247,749	$63,530	-$165,821	-$478,573	-$869,514
(-) Change in NWC	[redacted]	-$19,870	$191,357	$124,978	$113,417	$45,745	-$33,211	-$135,057	-$184,218	-$229,352	-$312,752	-$390,940
as % of revenue		-5.05%	36.75%	20%	15%	5%	-3%	-10%	-11%	-11%	-12%	-12%
Unlevered Free Cash Flow		-$50,931	-$279,337	-$231,730	-$231,623	-$179,633	-$73,265	$62,396	$138,666	$250,827	$437,332	$654,499
% growth		N/A	448.48%	-17.04%	-0.05%	-22.45%	-59.21%	-185.17%	122.23%	80.89%	74.36%	49.66%
Discounted Cash Flow				-$217,530	-$204,108	-$148,593	-$56,892	$45,483	$94,885	$161,116	$283,701	$370,465

Weighted Average Cost of Capital (WACC)	
Current Share Price (03/04)	$26.20
Shares Outstanding	113,200
Market Capitalization	$2,965,840
Total Debt	$168,010
Cash and Cash Equivalents	$266,240
Net Debt	-$98,230
Percent Equity	94.64%
Percent Debt	5.36%
Risk-Free Rate	1.97%
Beta	0.95
Equity Risk Premium	5.17%
Cost of Equity	6.88%
Cost of Debt	0.36%
Tax Rate	21.00%
WACC	6.53%

Perpetuity Growth Rate	
Terminal Growth Rate	2.00%
Terminal Value	$14,744,633
Discounted Terminal Value	$7,834,466
Sum of Discounted Cash Flows	$308,527
Implied Enterprise Value	$8,142,994
Implied Equity Value	$8,241,224
Fair Value Per Share	$73
Implied Premium (%)	64.01%

Weighted Average Cost of Capital (WACC) vs. Perpetuity Growth Rate							
	6.5%	***7.0%***	***7.5%***	***8.0%***	***8.5%***	***9.0%***	***9.5%***
1.6%	61.2%	55.5%	49.5%	43.2%	36.5%	29.4%	22.0%
1.8%	62.7%	57.1%	51.2%	44.9%	38.3%	31.3%	23.9%
2.0%	64.3%	58.8%	52.9%	46.7%	40.1%	33.1%	25.8%
2.2%	65.9%	60.4%	54.6%	48.4%	41.9%	35.0%	27.7%
2.4%	67.5%	62.0%	56.3%	50.2%	43.7%	36.9%	29.7%

Comparable Company Analysis:

Company Name	Market Cap(Million)	Price/Sales	Current Ratio	Price/Earnings	Enterprise Value/Revenue	Net Promoter Score
Essilor Luxottica	74670	2.8	2.66	56.02	4.58	14
Alcon inc	35670	4.09	2.23	37.35	20.47	43
National Vision Holdings	3150	2.49	1.85	22.97	10.14	-28
Cooper Companies, Inc.	19420	7.28	2	75.9	6.2	55
PVH Corp.	6870	0.91	1.45	14.37	4.8	38
Canada Goose	4126	3.929	2.6	38.19	6.7	48
Allbirds	1605	6.16	2.9	N/A	6.07	86
Bath & Body Works	18270	1.38	2.08	9.66	14.97	44
New Look Vision Holdings	783	2.68	1.34	50.51	3.8	N/A
Synsam AB	1133.88	2.46	0.73	N/A	3.93	
High	74670	7.28	2.9	75.9	20.47	86
Low	783	0.91	0.73	9.66	3.8	-28
Mean	16569.788	3.4179	1.984	38.12125	8.166	37.5
Median	5498	2.74	2.04	37.77	6.135	43.5
Standard Deviation	23314.10262	2.008187046	0.669646673	22.37793839	5.509406502	33.13177155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