Microsoft Emerges as Early Leader in the Artificial Intelligence Race

OpenAI partnership sets Microsoft up well, but uncertainty reigns and the financial impact is likely incremental.

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While Generative AI Capabilities Are Groundbreaking, the Financial Impact Is Likely Incremental

In January 2023, Microsoft made its third round of investments in OpenAI, a company that specializes in artificial intelligence, specifically large language models, for a reported $10 billion over a multiyear period. OpenAI's ChatGPT has captured the attention of CEOs, software engineers, as well as the general public and has emerged as the quickest technology service to gain its first 1 million users, which took just five days, according to Sam Altman, OpenAI founder and CEO.

Combining the world's most popular productivity software in Microsoft 365 with the world's most advanced foundational AI models in GPT-4 should create a powerful force within the software industry. We think Microsoft immediately becomes among the best-positioned software company to lead into the golden age of AI. While we think this opens up another competitive vector against Alphabet and other AI providers; we think Microsoft's investments in OpenAI and related technology provide an early lead.

At once, Microsoft's partnership will make advanced generative AI available for mass trial, experimentation, and adoption within widely used software applications such as Microsoft 365, the company's productivity suite. Microsoft is already moving quickly to infuse its portfolio with OpenAI's advanced AI, including Microsoft 365, GitHub, Bing, and other solutions as well. We think this AI pervasiveness would further enhance customer switching costs and the company's network effect, rendering Microsoft's wide moat even wider, in our view.

We continue to view Microsoft as modestly undervalued, based on an apparent expectation that near-term demand will remain under pressure over the next several years. However, the OpenAI partnership contributes some potential upside that is not baked into our base-case estimates currently. Given the immense potential for productivity improvements, we can envision an upside scenario that is 5%-10% above our fair value estimate, thanks to higher AI-bolstered revenue growth. Still, we caution investors on the AI hype for Microsoft as the company's immense size makes it difficult for any new product to dramatically move the needle on valuation, in our view.

Companies Mentioned

Name/Ticker	Economic Moat	Moat Trend	Currency	Fair Value Estimate	Current Price	Uncertainty Rating	Morningstar Rating	Market Cap (Bil)
Microsoft MSFT	Wide	Stable	USD	325.00	302	Medium	★★★	2,270

Key Takeaways

- In our opinion, we are finally entering the AI age. AI has been in development for years, but OpenAI's ChatGPT has crystallized potential use cases for consumers.
- In January 2023 Microsoft invested multibillion dollars over a multiyear period in OpenAI, a company that has created a variety of powerful generative AI models. Details were not disclosed, but it is widely believed to be $10 billion for 49% of the company based on reporting from Semafor. Notably, the partnership between the two companies allows for OpenAI to accelerate research not only through the cash infusion, but also from Azure becoming the exclusive cloud provider for its application programming interface services.
- We think this has immediately lifted Microsoft to be one of the prime beneficiaries of the AI boom, with early access to OpenAI's models and an ability to commercialize the previous generation's models, and the attachment to OpenAI through Azure. We already see Microsoft releasing OpenAI-based advanced AI throughout its portfolio, including Microsoft 365, GitHub, and Bing, where we think the company can make the biggest splash.
- From a financial perspective, OpenAI reportedly expects to generate $200 million in revenue in 2023 and $1 billion in 2024. If this growth is realized and continues thereafter, Microsoft will likely earn a solid financial return on its investment in OpenAI over time.
- Our analysis suggests that advanced generative AI can achieve 50 to 100 basis points of incremental annual revenue growth for Microsoft over the next 10 years. Contrary to popular belief, we do not believe AI investments will weigh on Microsoft's margins, even as it invests in cloud infrastructure to host such AI. In turn, it's possible that generative AI can add in excess of $20 per share to our current $325 fair value estimate for Microsoft.
- Microsoft now has an early lead in AI, but we expect other software vendors to replicate Microsoft's moves—striking partnerships, building their own AI models, and/or using APIs to incorporate AI into their own products. Microsoft should still remain ahead of others over the next few years, but it certainly won't be the only software supplemented by AI.
- AI is in its infancy but raises concerns among consumers and governments around whether humans can control such technology over time. It's possible that AI will not be fully unleashed by OpenAI, Microsoft, or others. Such uncertainty is why we hesitate to implement our AI-related financial estimates into our base-case valuation for Microsoft.

Microsoft Invests Billions in OpenAI and Takes an Early Lead in LLM

On Jan. 23 Microsoft confirmed it invested "multibillion" dollars over a "multiyear" period in OpenAI. Disclosures surrounding the investment are fairly limited and tend to be of a high level in nature, but the strategic benefits include:

- Supercomputing at scale: Microsoft intends to invest in the development and deployment of supercomputing infrastructure to enable OpenAI to accelerate its AI research and development efforts and help customers construct and put into production their own AI applications.
- New AI-powered experiences: Microsoft intends to deploy OpenAI's models across its portfolio of enterprise and consumer applications and introduce new solutions as well. This includes Azure's OpenAI Service. As an update, Microsoft has already introduced advanced generative AI in a variety of key applications since its January investment.
- Exclusive cloud provider: Microsoft Azure is the exclusive cloud provider for OpenAI for research, applications, and API services.

While the details of this investment round have not been publicly disclosed, Semafor reported that the investment is for approximately $10 billion in cash and Azure credits that can be drawn on as needed. From a financial standpoint, Microsoft now owns 49% of the company and is entitled to 75% of OpenAI's profits until its investment is repaid. Other investors own 49% of the company, with 2% retained by the founders.

We think Microsoft is immediately lifted to be one of the prime beneficiaries of the AI boom, with early access to OpenAI's models and ability to commercialize previous-generation models, and the attachment to OpenAI through Azure. We already see Microsoft releasing OpenAI-based advanced AI throughout its portfolio, including Microsoft 365 and Bing, where we think the company can make the biggest splash. Ultimately, we think this AI pervasiveness would further enhance customer switching costs and the company's network effect, rendering Microsoft's wide moat even wider.

The OpenAI partnership is not exclusive, but Microsoft's position as the exclusive cloud provider and hosting of supercomputing infrastructure will give Microsoft an inside track to any new features and services provided by OpenAI over time. It seems unlikely that any other software vendor or cloud provider will deploy or offer OpenAI more effectively than Microsoft in the years ahead.

On a financial basis, our initial estimate is that OpenAI can boost Microsoft's revenue growth by 50-100 basis points annually over the next five to 10 years; this should not put material pressure on margins and can add in excess of $20 to our fair value estimate. Yet, we have not specifically incorporated these factors into our estimates based on the high level of uncertainty attached to AI adoption and exactly what shape unannounced AI solutions might take over the next few years.

OpenAI Is a Leader in Artificial Intelligence

OpenAI is a leader in AI systems. The company notably specializes in generative AI, which is an algorithm or system capable of creating content based on natural language instructions. The company's ChatGPT release in November 2022 was a groundbreaking moment as it thrust the advanced AI solution into the public spotlight. We have explored the capabilities of ChatGPT and DALL-E and came away shocked at the conversations ChatGPT was able to carry out and the random content it was able to generate, including writing concepts for various sitcoms we proposed, creating a hypothetical conversation between Bruce Lee and Han Solo on the topic of a pile of dirt, writing an earnings summary of Microsoft's most recent quarter, and much more unusual requests. We did the same with DALL-E, which generates graphical imagery based on natural language instructions. Again, we were beyond impressed by the functionality and output. We have selected two small examples of our interactions with these AI models and provide them in Exhibits 1 and 2.

Exhibit 1 ChatGPT Can Create Conversational Content With Human-Like Nuance

DA Can you describe yourself in a single paragraph?

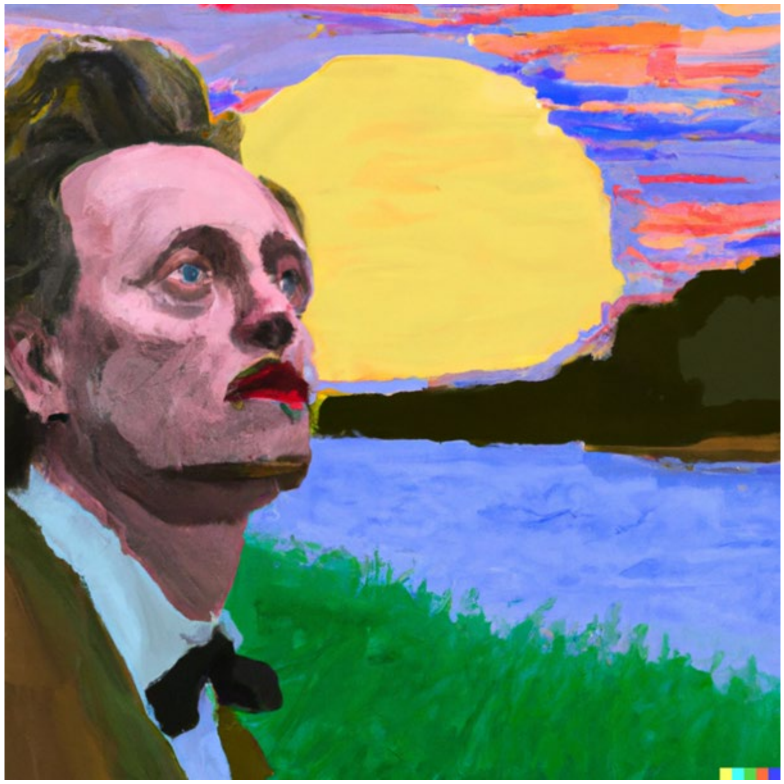
Sure, I am ChatGPT, a large language model developed by OpenAI. Trained on vast amounts of data using deep learning techniques, I have the ability to understand and generate human-like language, enabling me to engage in conversations with people on a wide range of topics. I am constantly learning and improving, and am designed to provide helpful and informative responses to any questions or queries that people may have.

DA What is ChatGPT?

ChatGPT is a large language model developed by OpenAI, based on the GPT-3.5 architecture. As a language model, ChatGPT has been trained on a massive amount of data, allowing it to understand and generate human-like language in response to a wide range of queries and inputs. It has been designed to engage in conversations with people, providing helpful and informative responses to their questions and comments. ChatGPT is an artificial intelligence technology that can be used to enhance customer service, provide assistance with various tasks, and even serve as a language learning tool.

Source: OpenAI ChatGPT, Morningstar.

Exhibit 2 DALL-E Produced This When We Requested an Impressionist-Style Painting of Christopher Walken Looking Into a Sunset



Source: OpenAI ChatGPT, Morningstar.

OpenAI was founded in 2015 by Sam Altman, Reid Hoffman, Jessica Livingston, Elon Musk, Peter Thiel, and others who collectively pledged $1 billion to form the venture. The company was founded as a nonprofit to publish academic papers and produce generative AI models with a stated goal to build powerful AI solutions and ensure that artificial general intelligence benefits all of humanity. In 2019 the company changed its structure to have the nonprofit entity as the parent, with a capped for-profit company operating underneath as it became obvious to the founders that they would need more funding to continue its operations and fund additional R&D. Exhibit 3 contains a brief timeline for OpenAI, along with several other important milestones for AI more generally.

Exhibit 3 Key Events in Artificial Intelligence and the Relationship Between Microsoft and OpenAI

Date	Event
6/30/68	Arthur C. Clarke's 2001: A Space Odyssey is published
5/11/97	IBM Deep Blue defeats Garry Kasparov in chess match
10/4/11	Apple Siri released
9/9/13	IBM Watson wins on Jeopardy!
11/6/14	Amazon Alexa released
12/11/15	OpenAI founded
12/31/16	OpenAI Universe released
3/11/19	OpenAI changes to a for-profit company
7/2/19	Microsoft invests $1 billion in OpenAI
6/11/20	ChatGPT-3 released
1/5/21	DALL-E released
6/30/21	Microsoft invests $2 billion in OpenAI
8/10/21	Latest version of OpenAI Codex released
6/29/22	Microsoft's GitHub Copilot Released
9/21/22	OpenAI Whisper released
11/30/22	ChatGPT-3.5 released
1/23/23	Microsoft invests $10 billion in OpenAI
2/3/23	Microsoft releases Teams Premium
2/7/22	Microsoft Bing AI closed beta begins
3/14/23	ChatGPT-4 released
3/16/23	Copilot for Microsoft 365 closed beta begins

Source: OpenAI ChatGPT, Morningstar.

While OpenAI rocketed into the public consciousness with the release of ChatGPT in November 2022, the company had actually commercialized a variety of models that offer different functionality, including language, fine-tuning, image, and audio. ChatGPT, along with other models under OpenAI's umbrella are natural language processing models. At its core, OpenAI has produced a family of large language models, which are algorithms that can recognize, summarize, translate, predict, manipulate, and generate text and other content based on knowledge accumulated from massive datasets and refined further through interactions with humans. Generative pretrained transformer is a breakthrough in natural language processing developed by OpenAI.

ChatGPT, for example, was trained on tomes of publicly available data sets, including Common Crawl, a web archive consisting of more than 400 terabytes and more than 3 billion web pages; WebText, an OpenAI developed dataset consisting of curated web-based data; two undisclosed internet-based books corpora believed to be BookCorpus and Library Genesis, which consists of more than 4 million books and approximately 80 million scholarly journal articles; and Wikipedia.

Given the volume of data ingested during the training of ChatGPT-3, ChatGPT-3.5, and ChatGPT-4, the power of the resultant AI models is astounding. It renders them well suited for a wide variety of natural language processing use cases as well as resolving queries about material they were not even trained for in the first place. In our view, the most obvious use cases for ChatGPT include:

- Language translation
- Search engine
- Chatbot
- Virtual assistant
- Text summarization
- Content generation

Whereas ChatGPT has stolen the spotlight, OpenAI has produced a variety of AI models with varying uses. We focused primarily on ChatGPT because we think it will be the workhorse for usage and revenue generation for OpenAI. In Exhibit 4 we describe OpenAI's key AI models and their capabilities.

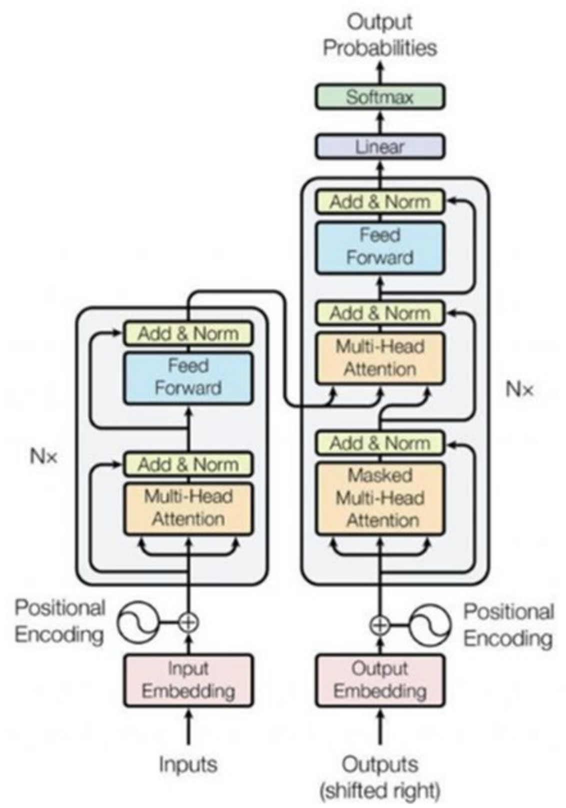
Exhibit 4 OpenAI Model Capabilities

Model	Capabilities
GPT-4	GPT-4 and its predecessors are a set of models that can understand and generate natural language and software code
DALL-E	Can generate and edit images based on natural language prompts
Whisper	Converts audio into text
Emeddings	A set of models that convert text into numerical form
Moderation	Can detect if text may be sensitive or unsafe
Codex	Codex can understand and generate code that is based on natural language prompts

Source: Morningstar.

To generate output from a foundational AI model, a user prompts the algorithm to produce something. The model then learns from human interactions in a process called reinforcement learning. Last, the system generates text based on predicting the words that go together based on all of the data ingested and all of the reinforcement learning. For corporate usage that involves specialized use cases, the AI model will go through a fine-tuning process, whereby it learns the specific language and examples of how a user's processes function to help produce more relevant output and a better user experience. The architecture for such a model was defined in Google's seminal 2017 research paper and is depicted in Exhibit 5.

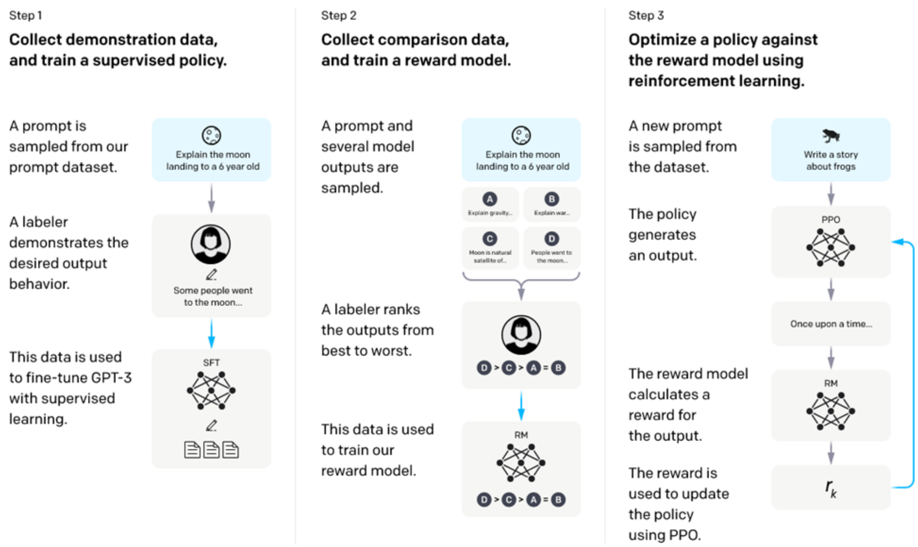
Exhibit 5 The Transformer Architecture Model Looks Simple Enough



Source: "Attention Is All You Need" paper by multiple authors at Google.

Training a large language model and fine-tuning is technically challenging, time-consuming, and costly. In an April television interview Amazon CEO Andy Jassy said the really good LLMs cost billions of dollars and take many years to train. In broader terms, the physical capacity to allow for such compute-intensive operations on high-end AI chips is prohibitively expensive for most potential users to build and maintain. Importantly, for Microsoft OpenAI's models are trained exclusively on Microsoft Azure. Training GPT 3, for example, included 175 billion parameters and took 34 days on 1,024 GPUs, which is approximately 835,000 GPU-hours of processing. For a sense of scale, Nvidia's high-end GPUs cost tens of thousands of U.S. dollars each.

Exhibit 6 Map of the Model Creation and Training Process



Source: OpenAI. Note: This has been published with permission from the company.

To commercialize these models, OpenAI offers an application programming interface that allows for the company's AI instances to be embedded in third-party applications. The pricing mechanism is consumption-based and varies according to which OpenAI model is being used. OpenAI uses a token approach to measure consumption. Each token represents approximately one syllable within a word, while the company maintains that a token is approximately 75% of a word. To use the model that powers ChatGPT for example, it costs $0.002 per 1,000 tokens. In Exhibit 7 we show OpenAI's pricing structure by model.

Exhibit 7 OpenAI Employs a Consumption-Based Pricing Mechanism

		Prompt	Completion	Usage
GPT-4	8-K Context	$0.03 / 1000 Tokens	$0.06 / 1000 Tokens	
	32-K Context	$0.06 / 1000 Tokens	$0.12 / 1000 Tokens	
Chat				
GPT-3.5-turbo				$0.02 / 1000 Tokens
InstructGPT				
Ada				$0.0004 / 1000 Tokens
Babbage				$0.0005 / 1000 Tokens
Curie				$0.002 / 1000 Tokens
Davinci				$0.02 / 1000 Tokens
Fine-Tuning			Training	Usage
Ada			$0.0004 / 1000 Tokens	$0.0016 / 1000 Tokens
Babbage			$0.0006 / 1000 Tokens	$0.0024 / 1000 Tokens
Curie			$0.003 / 1000 Tokens	$0.012 / 1000 Tokens
Davinci			$0.03 / 1000 Tokens	$0.12 / 1000 Tokens
Embedding				
Ada				$0.0004 / 1000 Tokens
Imaging				
DALL-E	1024x1024			$0.02 per image
	512x512			$0.018 per image
	256x256			$0.016 per image
Audio				
Whisper				$0.001 per second

Source: Morningstar and OpenAI.

OpenAI's Revenue Is Expected To Grow Rapidly

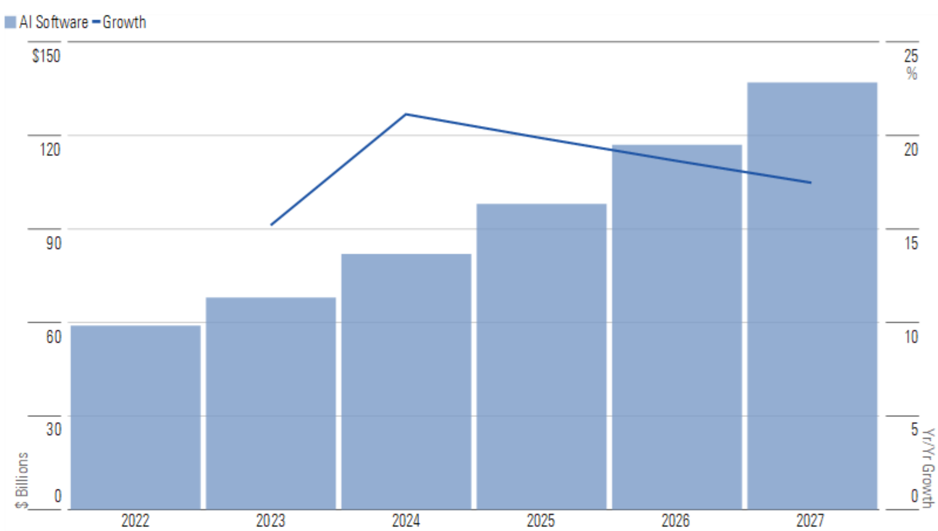
We believe OpenAI generated less than $50 million in revenue in 2022. It has been reported that the company's fundraising materials should have OpenAI generating $200 million in revenue in 2023 and $1 billion in 2024. This represents substantial growth and helps explain why Microsoft would invest $10 billion for 49% of the company. Given the long-standing promise and enormous potential of AI, this level of growth is not unfounded in our view.

Estimates vary widely for establishing a market size. PitchBook, for example, pegged the market for generative AI at $2.5 billion in 2022. On the larger side, many research providers see the AI market growing to about $1.5 trillion, including software, services, and hardware, approximately by 2030. The software portion in these blue sky scenarios typically makes up a majority of revenue, with services the next largest component, followed by hardware.

Like for many other hype cycles, we do not think AI is going to generate anywhere near $1 trillion annually in new revenue for software providers. We think there is an element of definitional gymnastics at play that tends to include or exclude certain items from market size analysis of this type and skew the results. We also note the lack of disclosure from companies that would help investors better understand the AI-associated revenue involved in current applications.

Critically, AI elements have been around for years already and are present within many software companies. Within our coverage, we point to powerful AI assistants and features in the form of Einstein within Salesforce, and Sensei within Adobe. We surveyed 10 data providers to estimate the market size for AI, and checked these estimates against total annual software spending of approximately $800 billion to arrive at our own market size estimate. Exhibit 8 contains our view of the software AI market in terms of size and growth over the next five years.

Exhibit 8 AI Has Broad Applications and Is Therefore a Substantial Market



Source: Morningstar. Data as of May 1, 2023.

The natural language processing market for advanced generative AI generally similar to OpenAI's technology is a subset of the overall AI software market. PitchBook sizes this market at $2.5 billion in 2022, while Gartner estimates it at $16.4 billion. We think the disparity is based on definitions, but agree that this is clearly a smaller market at present, which is obviously driven by the nascency of this niche. From a growth standpoint, we think generative AI easily outpaces the broader AI software market over the next five years.

Qualitatively, we see the rapid inclusion of generative AI functionality within our narrow coverage such that we think AI will quickly become table stakes within enterprise software applications and internet usage. Even if a software company has not yet adopted ChaptGPT or a similar model, we think they are working feverishly behind the scenes to make that happen. AI makes workers more productive, which lowers costs so there is a simple profitability argument to made. Additionally, there is the “me too” factor whereby no software company wants to be the one firm that cannot tout AI as a feature within its application or across its portfolio.

Ultimately, we think AI is an expensive proposition, which will serve to limit competition. It is costly to create the LLM in the first place simply from a specialized headcount perspective. Further, training an LLM requires significant hardware resources, most easily found at hyperscalers like Microsoft and Alphabet. Last, running an LLM at scale will clearly take a significant investment in infrastructure, where again, the hyperscalers are clearly advantaged.

We Expect To See Advanced AI From OpenAI Appear Throughout Microsoft's Portfolio

Based solely on the company's investments in OpenAI, Microsoft clearly has grand designs on AI. However, in March 2022 Microsoft completed the acquisition of Nuance for $19.7 billion, which is a conversational AI leader best known for algorithms that help generate automated reports on behalf of radiologists. So we can quickly surmise that for $30 billion in aggregate consideration for these investments, the company is indeed serious about AI within its portfolio. We already see specific instances of OpenAI appearing as upsells within the company's portfolio. Beyond that, remarks from company leaders and public statements underscore the importance of AI to Microsoft more broadly. We also believe that AI represents the next evolution in software and cloud computing platforms, and that Microsoft understands that the AI journey will be long.

Despite the investments in OpenAI sucking all of the AI oxygen out of the room, Microsoft already has a wide variety of AI-related solutions within its portfolio. Notably, Microsoft teamed up with Nvidia in a multiyear agreement to build powerful AI supercomputers to help train, deploy, and scale large language models. These are based on Azure's scalable virtual machine infrastructure using both Nvidia's AI stack, including workflows and software development kits, and tens of thousands of its advanced graphical processing units. Our research indicates that the more complicated the foundational model, that is, the more parameters it incorporates or the more data it ingests, the more expensive it is, which we think should be intuitive. However, the cost per parameter also increases, meaning that it is more than twice as expensive to train a model with 100 billion parameters than it is to train a model with 50 billion parameters.

The flipside of this equation is that Nvidia's GPUs are continually improving, meaning they can train models faster for the same cost. While the newest GPUs from Nvidia are twice as expensive, their performance is nine times better. We do not think it is clear yet, which side of this cost versus performance tug of war. However, one thing we are confident in is that engineers will always push the boundaries.

From our point of view, many products and use cases are obvious, with some going back years, including Clippy and Cortana. So natural evolutions of these early AI assistants should be expected throughout Microsoft's portfolio. However, we think the natural evolution would look like the jump from an amoeba to a primate to Charles Darwin. Whereas Clippy might have helped a user start a mail merge in Microsoft Word, Microsoft's products infused with OpenAI's generative AI are receiving the GitHub Copilot moniker. Copilot is an advanced processing and orchestration engine that combines ChatGPT with Microsoft applications and user data, files, habits, and context to create assistance well beyond a basic virtual assistant. The generative capabilities suddenly available are light years ahead of what we previously have seen described as AI. Within this section we attempt to highlight the main instances where Microsoft has already introduced OpenAI algorithms into its existing portfolio.

GitHub

GitHub Copilot uses OpenAI Codex to suggest code and entire functions in real-time as a programmer write lines of code. Codex is similar to ChatGPT, but it was trained by absorbing billions of lines of code from all programming languages in the public domain. GitHub Copilot works as either an auto-complete style editor, not unlike what is in a Google search bar, or it can be instructed to write code by using natural language instructions, like "write some code that would create a text input box on a website and insert a functional <accept> button." Since this instruction would be taking place in a code editor, Copilot would understand the programming language being used and would write for that language automatically. Once the user reviews and accepts the AI-generated code, it is part of the code base. Further, if the developer is not fully satisfied with the output, it can simply be edited as would normally be the case. GitHub Copilot reached general availability in June 2022 at a cost of $10 per month on an individual basis, or $19 per user per month for business users, with more features available to business users.

As of January 2023, GitHub had 100 million users. Within the first month of the GitHub Copilot release, the company had quickly amassed 400,000 subscribers for the advanced AI offering. Pricing tiers for the solution start with a free version and include a $4 per month tier (Team) and a $21 per month tier (Enterprise). In Exhibit 9 we estimate the annual revenue impact based on a blend of small user groups and enterprise subscribers and a series of penetration assumptions into the existing user base.

Exhibit 9 Incremental Annual Revenue Based on User Adoption Within GitHub User Base

	Penetration into GitHub User Base									
Annual Pricing	2%	4%	6%	8%	10%	12%	14%	16%	18%	20%
$48	$96	$192	$288	$384	$480	$576	$672	$768	$864	$960
$72	$144	$288	$432	$576	$720	$864	$1,008	$1,152	$1,296	$1,440
$96	$192	$384	$576	$768	$960	$1,152	$1,344	$1,536	$1,728	$1,920
$120	$240	$480	$720	$960	$1,200	$1,440	$1,680	$1,920	$2,160	$2,400
$144	$288	$576	$864	$1,152	$1,440	$1,728	$2,016	$2,304	$2,592	$2,880
$168	$336	$672	$1,008	$1,344	$1,680	$2,016	$2,352	$2,688	$3,024	$3,360
$192	$384	$768	$1,152	$1,536	$1,920	$2,304	$2,688	$3,072	$3,456	$3,840
$216	$432	$864	$1,296	$1,728	$2,160	$2,592	$3,024	$3,456	$3,888	$4,320
$240	$480	$960	$1,440	$1,920	$2,400	$2,880	$3,360	$3,840	$4,320	$4,800
$264	$528	$1,056	$1,584	$2,112	$2,640	$3,168	$3,696	$4,224	$4,752	$5,280

Source: Morningstar. Data as of May 1, 2023.

Assuming a blended user base for pricing at $10 per month, a growing GitHub user base over the next 10 years, and penetration increasing to approximately 20% using Copilot, we see possible incremental value of $4 per share for Microsoft.

Bing

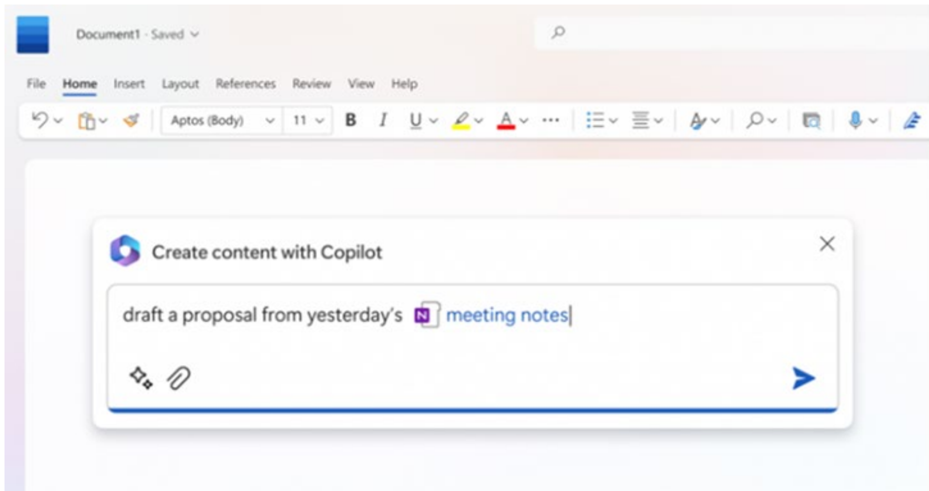
Microsoft held an event in February 2023 to preview a new Bing search engine powered by OpenAI's ChatGPT. The new Edge browser was then launched in March and included the new Edge Copilot, which is based on OpenAI's ChatGPT-4. This last fact is important because it represents an advance from older versions of OpenAI's previous foundational models. Every iteration of these large language models is based on more data, includes various improvements, and ultimately delivers better performance for the end user. We have extensively experimented with the new Bing and believe it is the first obvious major improvement in search technology in years. The new Edge browser appears, on the surface, to be a significant step-up as well. Microsoft's announcement drew an immediate response from Alphabet about its own BARD AI-enhanced search capabilities.

Like every other internet search engine, Bing is inconsequential relative to Google. However, over the last five to ten years, Bing has gained modest internet search share, albeit at the expense of Yahoo rather than Google. From a financial perspective, we believe each point of internet search represents approximately $2 billion in incremental advertising revenue. From there we calculate that each point of Bing search share gains for Microsoft adds approximately $2 per share in incremental value. We believe Microsoft has already attracted an increased share of search activity but the jury is still out to whether that is a permanent shift or just experimentation with the novelty of the new Bing.

Microsoft 365

Most recently, On March 16, 2023, the company introduced Microsoft 365 Copilot, which infused the generative AI capabilities of ChatGPT throughout the most popular applications in the company's famous productivity suite, including Excel, Word, and PowerPoint, in addition to what has already been released with Teams, Dynamics, and Power BI. While the solution is in early beta testing with just 20 customers, we think the ability for a typical corporate knowledge worker to tell Microsoft Word in natural language prompts to write a two-page summary and analysis and recommend next steps based on a strategy memorandum document and an Excel spreadsheet should serve as a pivotal moment in AI adoption. Given that this feature is in closed beta, pricing information is not yet available.

Exhibit 10 Microsoft Has Introduced Copilot to Productivity Suite, Microsoft 365



Source: Morningstar. Data as of March 16, 2023.

Over the past several months while the hype around generative AI has grown to a fever pitch, we have maintained that the inclusion of ChatGPT within the office productivity suite represented the most important opportunity for the company. This is because productivity software represents the primary way most office personnel interact with software, so therefore the market is the largest from a user perspective, while also being the most obvious way to make users comfortable with powerful generative AI capabilities. Over the next few years, we believe generative AI adoption within Microsoft 365 can add billions of dollars to Microsoft's annual revenue. Depending on the pricing uplift and product bundling, it is not a stretch to see $2 billion-$3 billion in incremental revenue within a couple years.

In Exhibit 11, we explore potential revenue impact based on possible penetration into our current assumed Microsoft 365 commercial user base of approximately 375 million in a variety of pricing scenarios. It should be obvious, but we believe the user base will continue to grow. In 2016 the company believed there were 1.2 billion total office users, so we think there is a long tail for Microsoft 365 users from current levels. The company's current enterprise SKU is E5, which has a list price of $57 per user per month. We think there are several possibilities for pricing Microsoft 365 Copilot:

- It will be included in a new higher priced SKU beyond the premium E5 bundle
- It will be an add-on feature available to E5 users for an additional fee
- It will be included in the E5 bundle, which will then see a price increase

Exhibit 11 Incremental Revenue Growth ($m) Based on User Adoption Within Microsoft 365 Subscriber Base

	Penetration into Commercial Office User Base									
Annual Pricing	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
$12.00	$225	$450	$675	$900	$1,125	$1,350	$1,575	$1,800	$2,025	$2,250
$24.00	$450	$900	$1,350	$1,800	$2,250	$2,700	$3,150	$3,600	$4,050	$4,500
$36.00	$675	$1,350	$2,025	$2,700	$3,375	$4,050	$4,725	$5,400	$6,075	$6,750
$48.00	$900	$1,800	$2,700	$3,600	$4,500	$5,400	$6,300	$7,200	$8,100	$9,000
$60.00	$1,125	$2,250	$3,375	$4,500	$5,625	$6,750	$7,875	$9,000	$10,125	$11,250
$72.00	$1,350	$2,700	$4,050	$5,400	$6,750	$8,100	$9,450	$10,800	$12,150	$13,500
$84.00	$1,575	$3,150	$4,725	$6,300	$7,875	$9,450	$11,025	$12,600	$14,175	$15,750
$96.00	$1,800	$3,600	$5,400	$7,200	$9,000	$10,800	$12,600	$14,400	$16,200	$18,000
$108.00	$2,025	$4,050	$6,075	$8,100	$10,125	$12,150	$14,175	$16,200	$18,225	$20,250
$120.00	$2,250	$4,500	$6,750	$9,000	$11,250	$13,500	$15,750	$18,000	$20,250	$22,500
$132.00	$2,475	$4,950	$7,425	$9,900	$12,375	$14,850	$17,325	$19,800	$22,275	$24,750
$144.00	$2,700	$5,400	$8,100	$10,800	$13,500	$16,200	$18,900	$21,600	$24,300	$27,000
$156.00	$2,925	$5,850	$8,775	$11,700	$14,625	$17,550	$20,475	$23,400	$26,325	$29,250
$168.00	$3,150	$6,300	$9,450	$12,600	$15,750	$18,900	$22,050	$25,200	$28,350	$31,500
$180.00	$3,375	$6,750	$10,125	$13,500	$16,875	$20,250	$23,625	$27,000	$30,375	$33,750

Source: Morningstar. Data as of May 1, 2023.

Looking longer term, assuming Microsoft 365 seat growth decelerates from 10% in calendar 2023 to 5.5% in 2032, a 25% penetration into the resulting user base, and $5 per user per month pricing, we calculate approximately $12 billion in incremental revenue annually in 2032 for Microsoft. This suggests $9 per share in incremental value just from the inclusion of AI within Microsoft 365. Given the rapid pace of AI innovation and product introduction within the software industry over the last six months, we do not expect Microsoft 365 Copilot to stay in beta for long, and pricing therefore will not be a mystery for long either. We are simply trying to illustrate the potential revenue and valuation impact.

Azure OpenAI Service

Microsoft offers Azure OpenAI Service and Azure AI on its public cloud platform. At the core of these offerings are the large language models from OpenAI that Microsoft was authorized to commercialize as part of the investments the latter has made into the former. The primary solutions under the OpenAI umbrella are pre-trained large language models, including GPT-4, and custom AI models that have been fine-tuned using data and parameters provided by the customer. Microsoft's Azure AI includes services in applied AI, machine learning, AI infrastructure, and cognition. Underlying this portfolio of AI related services are the benefits typically associated with Azure. This is particularly important because large language models require hyperscale infrastructure. With the explosion of practical AI currently overtaking the software industry, it is reasonable to assume that Microsoft, with its partnership with OpenAI and its leading position in public cloud, should be a prime beneficiary. To that end, we believe AI services on Azure can add another $700 million annually within five years and ultimately be accretive to our fair value estimate by $4 per share.

Teams Premium

Microsoft has also released Teams Premium, which as the name suggests, is a feature-rich version of the popular application that comes standard in Microsoft 365. Teams premium reached general availability in February 2023 and costs an extra $10 per user per month. From an AI perspective, the enhanced version of Teams provides post-meeting tasks, post-meeting summaries, improved meeting transcripts, and real time translation during meetings, among other features. We think Teams Premium is difficult to assess from a financial standpoint because Microsoft's UCaaS offering is young and the market remains overwhelmingly legacy and on premise from a telephony standpoint. Ultimately we think penetration of Teams Premium will be relatively small, so the bigger question remains how many UCaaS seats will the company capture. That said, we think this is a functional area where generative AI shines. For now we think the Teams Premium offering will have a modest impact financially. Longer-term, however, Teams Premium could add hundreds of millions of dollars annually to revenue.

Viva Sales

Microsoft Viva Sales is another product incorporates Copilot. It seeks to combine Microsoft Dynamics CRM (or any other CRM application) with Microsoft 365 and OpenAI's generative AI to deliver insights in real-time to automatically generate content in an effort to free up sales representatives to focus on their most pressing needs. Personalized and detailed responses to inbound email can be generated by Copilot and edited by the user before sending. Meeting summaries or action items can be generated by ChatGPT and included with follow-up emails and action items as part of the sales process with clients. Pricing for Viva Sales is $40 per user per month and is already available globally in more than 15 languages. Given the relatively small size of Dynamics within Microsoft of approximately $4 billion in annual revenue, and the fact that this includes all of the ERP functions of the suite, rather than solely Dynamics CRM, we estimate a nominal financial impact over the next several years.

Power BI

Advanced AI has also made its way into Microsoft's Power BI platform. Here, customers can use virtual agents powered by GPT-4 to have more meaningful and in-depth engagements with their own customers, and users can employ low code generative AI to create and automate a wide variety of processes. We also see AI Insights, notably Text Analytics and Vision, as important functions that allow for more robust query and analytics capabilities.

Clearly OpenAI's large language models are already being incorporated within Microsoft's existing portfolio at a breathtaking pace. While some of these products are in beta, others are already generating revenue. We think the inclusion of advanced generative AI in solutions that are the most widely used, such as Bing and Microsoft 365, is the most critical thrust. We also believe Azure will play a critical role for the industry as a hole as it trains and runs generative AI for the coming crush of other companies. As users are exposed to these capabilities and they understand both the power and potential problems they will likely become more comfortable with AI. Comfort then, should drive further adoption in a virtuous circle in our view.

The pace of innovation over the last six months has been nothing short of remarkable. Companies from across our coverage are raising their AI profiles as well. Many are publicly touting ChatGPT integrations, while others are introducing their own advanced generative AI capabilities. Adobe notably unveiled its Firefly family of AI models at Summit in March 2023 and stated more models and AI features were coming over the next few months—not years.

Still, Microsoft may have other AI ideas in mind, and over the long term, we think AI will creep into all areas within the portfolio. Over the near term, however we think the most obvious area where the powers of generative AI can be brought to bear are within Dynamics 365. As previously described, we already see advanced AI within Viva Sales. However, Microsoft's previous iteration of its Digital Contact Center Platform left a lot to be desired. Rather than being a fully baked contact center with automation and conversational AI baked in, it was more of an architecture and promise than a well-rounded suite. With Teams and Dynamics 365, we think Microsoft has an opportunity to make a quantum leap in customer service and contact center solutions by virtue of the existing applications within Dynamics 365, Power BI, the conversational AI of ChatGPT, and even Microsoft 365.

Microsoft's Wide Moat Will Be Enhanced by Its OpenAI Partnership

Microsoft enjoys a wide moat rating, in our view, arising from switching costs, network effects, and cost advantages. We believe each of the company's segments benefits from both switching costs and network effects, while the Intelligent Cloud segment also carries cost advantages. In aggregate, these moat sources should combine to drive economic returns well in excess of its cost of capital for years to come.

Exhibit 12 Microsoft's Wide Moat Is Derived From a Variety of Moat Sources

Segment	Moat Rating	Switching Costs	Bolstered By AI	Network Effects	Bolstered By AI	Cost Advantages	Bolstered By AI
Productivity and Business Processes	Wide	🏰	✓	🏰	✓		
Inteligent Cloud	Wide	🏰	✓	🏰	✓	🏰	✗
More Personal Computing	Narrow	🏰	✓	🏰	✓		
Microsoft	**Wide**	🏰	✓	🏰	✓	🏰	✗

Source: Morningstar.

Combining the three segments, Microsoft offers solutions including Microsoft 365 (formerly Office), Dynamics, LinkedIn, Windows Server, SQL Data Base Management System, Azure, and of course, Windows. In aggregate, these solutions drive a wide moat rating based on high switching costs and network effects. They represent core elements of an enterprise's software stack that are mission critical to business operations. Replacing core infrastructure or architecture elements is rarely done in practice, which is the embodiment of our switching cost argument. Truly, without them an enterprise would not function.

Switching away from Microsoft solutions is therefore challenging because there are financial costs associated with implementing, testing, and training users on the new software; operational costs as this process disrupts normal business practices and introduces a new risk of data loss; and human capital risks in terms of lost productivity. We also believe the network effects are at play as more users within the company's massive installed base attract more developers to engineer add-on applications and other solutions that are designed to enhance user experience. As the software's capabilities and user experience improve, it attracts more customers, thus completing the virtuous circle.

Adding an important set of capabilities such as generative AI to an already dominant suite like Microsoft 365 or a mission critical ERP system or module that should clearly allow for improved productivity and ultimately cost savings and in our view will serve to strengthen Microsoft's moat from both a switching cost and network effect perspective.

Azure, which resides in the Intelligent Cloud segment, is the one wide moat element of Microsoft that we assess as being somewhat different in that we identify its moat sources as switching costs and cost advantages. Switching costs should be obvious in that there are linkages among non-Azure software elements, various Azure cloud services in use, as well as data egress charges. The same issues that percolate for Microsoft's other software solutions remain present here.

The cost advantage, however, resides as a unique moat source within Microsoft. We believe it is initially cheaper for most companies to move workloads to the cloud, as there are less upfront costs and a lower bar to clear for maintenance and administration. In large enterprise customers is where the breakeven occurs between on premise and cloud, but the variables of each individual customer matter. Along those lines, Microsoft offers scale advantages to Azure clients in that at least some cloud offerings are cheaper relative to other cloud providers and has scale matched by only AWS. We view the network effect here as being largely unchanged by the inclusion of generative AI throughout Microsoft's portfolio.

We Do Not Think the Market Has Fully Digested OpenAI and Generative AI More Broadly

The introduction of advanced AI of the nature described in this report has far reaching effects. However, we are at the beginning of this journey, rather than the end or even the middle of the movie where we think we have a sense of the plot. Our sense is that there are three views on advanced generative AI, with two of them being polar opposites.

1. The world is ending, AI must be stopped.
2. Everybody will have AI so this is no big deal.
3. No idea what to make of AI just yet.

AI Has Risks, but We Do Not Think It Should Be (or Can Be) Halted

A review of headlines in the popular press suggests that the world is ending. We see words like "dangerous" in these headlines. This fear and lack of understanding has all the hallmarks of either The Matrix, The Terminator, or 2001: A Space Odyssey. Predictably, governments have passed or are contemplating passing laws or making rules that prevent or curtail the capabilities OpenAI brings to bear.

In March 2023, hundreds of technology luminaries, including Elon Musk and Steve Wozniak signed an open letter calling for “all AI labs to immediately pause for at least 6 months the training of AI systems more powerful than GPT-4." The letter added that if key players do not agree then "governments should step in and institute a moratorium." Italy, for example, has banned ChatGPT temporarily over data privacy concerns. It is not clear that this letter is immediately being considered by other regulators more broadly toward a series of public policies.

We acknowledge that there are several potential risks that may come from AI if left unchecked. Such concerns may include:

- Potential job losses due to automation
- Social surveillance and manipulation
- Misuse
- Intellectual property rights
- Biases and inaccuracies in training data result in biases and inaccuracies in output
- A variety of worst-case disaster scenarios, unlikely as they may be, such as autonomous weapons systems being commandeered by AI systems or breakdowns of the financial system.

We think these fears miss the mark, at least with OpenAI's products to date. In our view, the way to mitigate these risks will likely be along several vectors, including both domestic and international regulations; and internal corporate standards, controls, and disclosures. We think trial and error in model development and usage will be an important factor as users become more comfortable working with these new advancements. AI is at the forefront of technology and is therefore likely to require creative guardrails in our view, but we doubt there will be a mechanism or will to do much to slow proliferation.

Ultimately, ChatGPT, for example, is just another software tool. It helps users perform a task more quickly than they otherwise would be able to without it. As an example, GitHub Copilot writes code a user prompts it to write. The user then has the option to accept the code, edit it further before accepting, or reject it outright. There is no ability for Copilot to write code without being prompted, or to ensure it is incorporated into the larger code base of the project, or to be executed. We have not even seen generative AI solutions broadly introduced as features or adopted so we think the fear is premature.

Future Job Losses Are a Concern, but Others Should Be Created

Perhaps the most cited of the fears listed above is that generative AI may replace certain, if not most knowledge worker positions. We similarly think this misses the mark. Again, these LLMs and their interfaces are just tools. They help write code faster, summarize meetings, and streamline customer service by handling basic requests or problems. They make professional jobs easier by improving efficiency. Generative AI helps by handling more mundane tasks so knowledge workers can focus on the value-added parts of their jobs. It helps employers improve worker productivity.

Further, even if some jobs do start being replaced by generative AI, AI itself will likely create jobs. After all, AI models are software based and must be written, trained, and maintained. Web developers, for example, did not exist before the internet. Content creation on the internet certainly has pressured legacy content creation for magazines and newspapers. We will reconsider our position on this when we start seeing entire professions suddenly out of work.

On the flip side, technology companies have been lamenting for years that finding capable software engineers is a real challenge. Given the specialty required for generative AI development, we suspect capable engineers will be even harder to find and will likely command premium salaries in an already handsomely paid profession. That said, Silicon Valley has been dealing with talent wars for decades so this is likely more of the same in our view.

AI Should Not Be Dismissed, Even if the Industry Leaderboard Remains the Same

In the second camp, we think the stance that generative AI is "no big deal" is also off the mark. This technology is powerful and we think it will be a useful tool for improving efficiency for knowledge workers. As outlined in this report, we can see new revenue streams for Microsoft and other software vendors, even if we think higher priced SKUs containing GPT-4 might only drive incremental revenue for the company. We can see many tasks where generative AI will make certain professions easier and help streamline a variety of tasks. This is not inconsequential.

Conversely, the market reaction has been to send Microsoft shares up directionally, albeit better than average, with many technology peers. Technology in general has performed reasonably well and Microsoft just reported an excellent quarter that had little to do with AI. So maybe the OpenAI announcement is driving shares up, but maybe not.

We see venture capital funding pouring into AI startups, and we see DeepMind being acquired by Google and OpenAI receiving an eye-popping valuation. There are clearly real software solutions underlying all of this. They are already being introduced to the public and generating modest revenues. Mostly these solutions are helping us do what we have already done in a more efficient manner. We think eventually there are new applications and new business models that we have not contemplated.

In the meantime, the OpenAI is available for others to license and use as well, giving them access to powerful generative AI. Both Amazon and Google offer cloud-based AI services, and there are plenty of startups offering AI solutions. Therefore the hyperscalers remain hyperscalers and further embed themselves within customers, and everybody can access ChatGPT or an equivalent and therefore not much changes. On this last point, we agree.

Finally, the third group of people that do not know what to make of AI is a reasonable camp to be in. We view the technology and competitive landscape as being in its very early days. The potential for change is enormous. A well established market with a variety of competitors and products does not exist. Estimates are that OpenAI generated $50 million in revenue in 2022. It's a big leap to extraploate much from $50 million to "the world is ending," but we would also caution investors not to say "this is no big deal" either. This report should help dispel the more extreme views, while assisting the "I don't know" crowd with some potential tangible solutions and possible financial implications.

Eventually, We Foresee AI Coming to Virtually All Software Offerings

We also believe that advanced generative AI will soon be offered across virtually all software offerings. Some believe that AI will depress margins as companies have to invest to keep up. We do not think this will be the case, or at least that the margin pressures resulting from AI investments will be manageable. We think larger companies can develop AI as another research and development project within a portfolio of such programs. For example, Adobe has been building its own advanced AI capabilities quietly for the last couple years even as it was expanding margins. Further, many companies will simply be using OpenAI, or one of its competitors, through an API. In these cases, the software company would most likely be charging the end-user for this in a premium pricing tier, thus maintaining their margin structure.

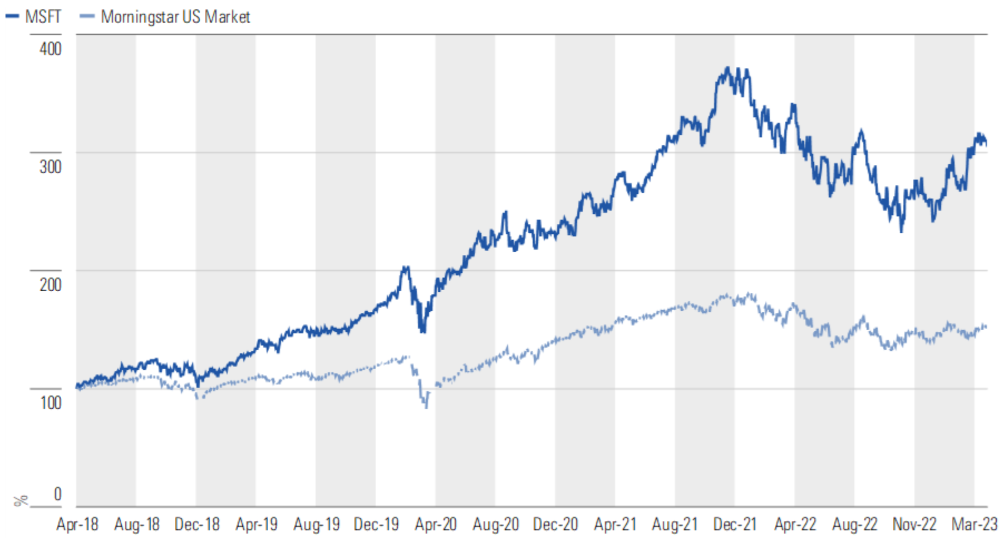
Software companies are not standing still and are racing to bring forth their own advanced generative artificial intelligence features. Various consultancies, internet firms, and semiconductor companies are also well positioned to capitalize on the AI boom. Many companies are already touting their ChatGPT API integration, while others have introduced their own unique and powerful AI instances. We think the largest companies we follow have the most resources at their disposal and are thus better positioned to build, train, and maintain AI algorithms. That said, we think independent AI developers like OpenAI, will license their technologies to other companies, thus making highly advanced AI models available to smaller companies.

Shares of Microsoft Have Rallied In 2023, but AI Adoption Could Drive Further Gains

The past several years have been a roller coaster for software stocks, characterized by a sharp decline upon news of COVID-19 lockdowns in early 2020, followed by strong performance throughout the rest of the year that continued during 2021 as companies invested heavily in their software systems to allow for remote and hybrid work environments. 2022 then was the inevitable collapse as shares suffered from a demand slow-down, a sharp currency headwind, war in Ukraine, surging inflation, and normalization of valuation levels from the halcyon days of the previous seven quarters.

Shares of Microsoft are up between 25% and 30% into early May. We think this is largely market sentiment driven, with the broader software group and the market both trending higher as well. While this loosely coincides with the substantial investment into OpenAI in January, we do not believe investors have reached any conclusions on the impact OpenAI could have on Microsoft given what little information exists. However, the fact that the shares did not react much differently from software more broadly suggests that the investment into OpenAI is incremental for Microsoft, which is consistent with our analysis.

Exhibit 13 Shares of Microsoft Have Performed Well This Year but Have Had No Obvious Bump from OpenAI

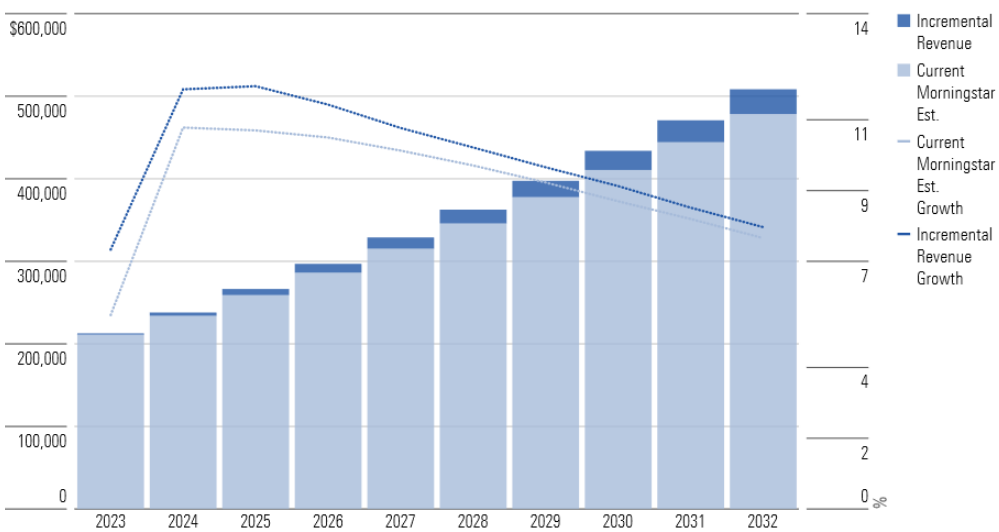


Source: Morningstar. Data as of May 1, 2023.

The OpenAI Partnership Can Add Modest Revenue to Microsoft's Top Line

Based on the integration of OpenAI into Microsoft's product portfolio as discussed above, we see an upward bias to our revenue estimates over time arising from the inclusion of advanced, generative AI features within Microsoft applications. We can envision 50-100 basis points of incremental annual revenue growth over the next 10 years. To summarize, we think Microsoft can conceivably achieve this with stronger pricing on products such as Microsoft 365, GitHub, Dynamics 365, among others.

Exhibit 14 We Think Advanced Generative AI Can Drive 50-100 Basis Points' Incremental Revenue Growth Annually



Source: Morningstar. Data as of May 1, 2023.

AI Will Likely Require Additional Investments, but We Do Not Envision a Drag on Microsoft's Operating Margin

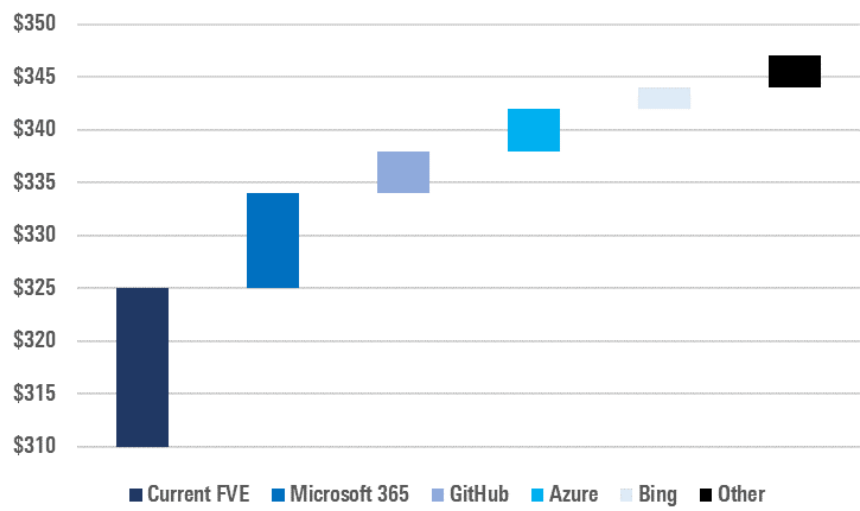
Contrary to popular belief, we do not believe AI investments will weigh on Microsoft's margins, even as it invests in cloud infrastructure to host such AI. Microsoft's R&D expense as a percentage of revenue has averaged 13.3%, which includes the period where the company acquired both Nokia in 2013 and LinkedIn in 2016, as well as the launch and scaling of Azure and the transitioning of from perpetual license Microsoft Office to subscriptions of Microsoft 365. R&D ranged from a high of 15.4% in fiscal 2009 to a low of 12.3% in fiscal 2021 during this period. Aside from that obvious spike, the next highest was 13.9% in fiscal 2010. In short, this was a period of enormous change and investment that literally changed the direction of the company, however, incremental R&D investment was barely perceptible.

Further, Adobe just announced its powerful generative AI models, dubbed Firefly, after a period of lower R&D expenses as a percent of revenue in each year from fiscal 2019 to fiscal 2021, with a slight uptick in fiscal 2022. In other words, the precedent has been set, and impressive generative AI models can be created and trained while R&D is managed by companies with substantial engineering and financial resources.

Microsoft's capital expenditures as a percent of sales have ramped up over time, with a noticeable transition between fiscal 2015 when investment was 6% of revenue, to fiscal 2018, when it hit a new normal level of 10%-12%. That period coincides well with when the company would have concluded that Azure, after generating about $1 billion in revenue while growing in excess of 100% annually, was worthy of substantial investment. Microsoft has already built the infrastructure needed to train LLMs and implement AI as a service. Assuming the service proliferates, the company will have to continue to invest, but like it was for Azure, Microsoft will be well compensated for its investment.

Assuming stable free cash flow margins in the low 30% area, we believe advanced generative AI can add $22 of potential upside to our fair value estimate, as shown in Exhibit 15.

Exhibit 15 We Estimate $22 of Upside to Our Fair Value Estimate Arising From AI Features



Source: Morningstar. Data as of May 1, 2023.

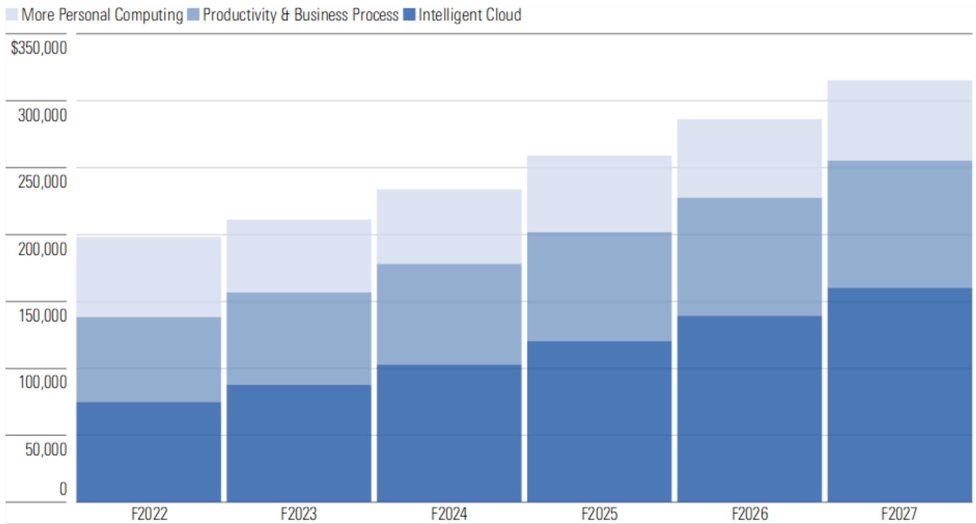
Regardless of OpenAI, We View Microsoft as Undervalued Today

While the premise of this report was to explore Microsoft's investment in OpenAI and put some guardrails around the potential financial impact, we think shares of Microsoft are undervalued regardless of OpenAI. Our long-term thesis centers on the proliferation of hybrid cloud environments and Azure, as the firm continues to use its on-premises dominance to allow clients to move to the cloud at their own pace. We continue to center our growth assumptions around Azure, Office E5 migration, and traction with the Power platform for long-term value creation. That said, we continue to believe that results will remain subdued in the near term based on macroeconomic factors.

Since taking over as CEO in 2014, Satya Nadella has reinvented Microsoft into a cloud leader such that it has become one of two public cloud providers that can deliver a wide variety of PaaS/IaaS solutions at scale. Additionally, Microsoft embraced the open-source movement and has largely transitioned from a traditional perpetual license model to a subscription model. The company has also enjoyed great success in upselling users on higher priced Microsoft 365 (formerly known as Office) versions, notably to include advanced telephony features. These factors have combined to drive a more focused company that offers impressive revenue growth with high and expanding margins.

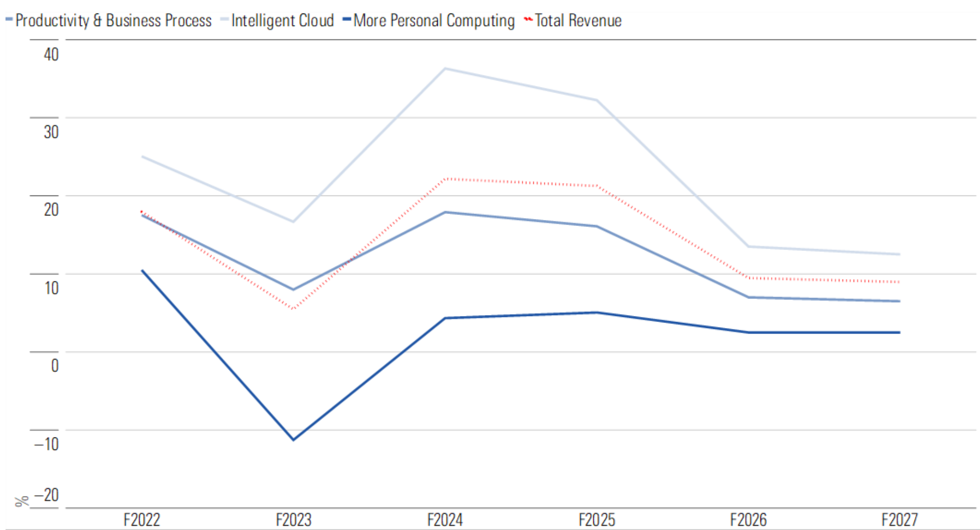
From a growth perspective, we see the intelligent cloud segment, which contains Azure, as driving growth over the next five years, with productivity and business processes, which contains Microsoft 365, to be the next-fastest-growing segment, and more personal computing to grow the slowest.

Exhibit 16 We Expect PBP and Intelligent Cloud To Drive Revenue Growth Over the Next Five Years



Source: Morningstar estimates. Data as of May 1, 2023.

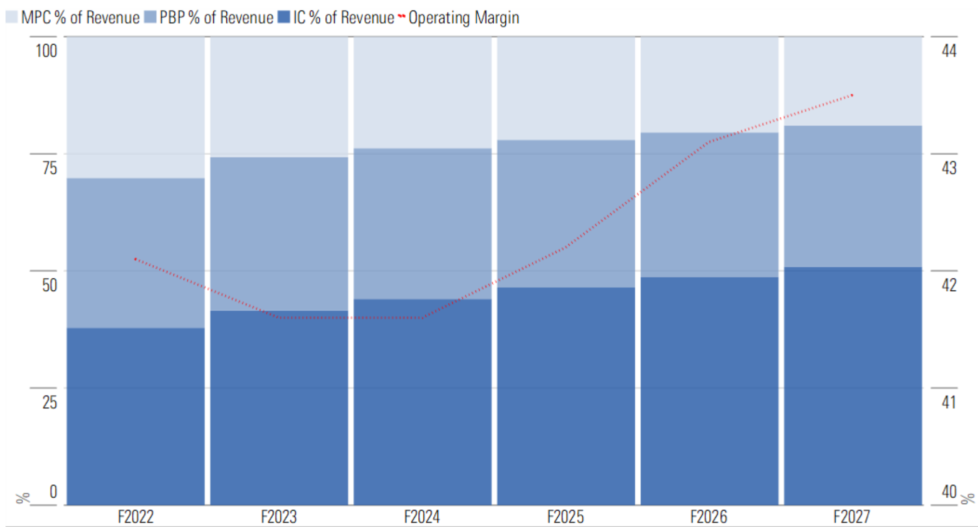
Exhibit 17 More Personal Computing Is Consistently Microsoft's Slowest-Growing Segment



Source: Morningstar estimates. Data as of May 1, 2023.

We also see operating margins grinding higher over time after an initial dip this year in fiscal 2023 driven by post-COVID-19 normalization and macro pressures. We see modest improvements in gross margin as Azure continues to scale, coupled with modest scale in research and development and general and administrative. It helps that the two segments with the fastest-growing revenue are also the two highest-margin segments.

Exhibit 18 We Expect Gradual Margin Expansion Over Time as MPC Revenue Shrinks Within the Mix



Source: Morningstar estimates. Data as of May 1, 2023.

In short, we estimate revenue growing at compound annual growth rate over the next five years of nearly 10%, with margins expanding approximately 50 basis annually over the medium term. Our fair value estimate is $325 per share. Management's capital allocation has been exemplary, with a balance of investments back into product innovation and Azure expansion, share buybacks, a modest dividend yield, and smart acquisitions. Finally, Microsoft enjoys a wide moat based mainly on switching costs, but also on network effects and cost advantages.

We View OpenAI as a Sound Strategic Investment for Microsoft

OpenAI believes it will generate approximately $200 million in revenue in 2023, leading to a valuation of approximately $20 billion, assuming reports of Microsoft's $10 billion investment for 49% of the company are accurate. Thus, Microsoft valued OpenAI at about 100 times revenue, on the extreme high end of software acquisitions.

The latest funding comes is after preceding investment rounds in 2019 and 2021. The initial $1 billion investment in 2019 was also for a multiyear period, which was later revealed by OpenAI to be five years and that the cash could be drawn on as needed. In 2021 Microsoft invested $2 billion with less fanfare than its initial investment. Notably, that transaction joined Microsoft and OpenAI at the hip by making Azure OpenAI's exclusive cloud provider.

At the time of the investment in January 2023, Microsoft had nearly $100 billion in cash and marketable securities and generated $65 billion in free cash flow in fiscal 2022. Thus, a $10 billion investment, while not insignificant, is small relative to the company's financial resources. Microsoft already has a

$68.7 billion deal pending for Activision Blizzard, which is in jeopardy, for example. With the OpenAI investment, Microsoft strategically forges an important partnership with a leading AI provider and nominally can earn an attractive return from a financial standpoint in the long run.

Notably, OpenAI changed its structure to allow for capped returns for investors. Early investors were allowed returns of up to 100 times their initial investment, with later investment rounds receiving a smaller cap. We believe Microsoft's initial $1 billion is subject to the 100 multiple, meaning that Microsoft can earn up to $100 billion on its investment in OpenAI, but it is not clear what multiple would apply to subsequent investments.

Ultimately we think there are two likely outcomes for an OpenAI exit: an IPO or an outright acquisition by Microsoft. We believe it is likely that Microsoft eventually acquires the remaining 51% of OpenAI. It seems likely that Microsoft already tried to acquire OpenAI outright but the founders may have been wary of a full corporate ownership. It is also possible that Microsoft did not want to go in completely with a $20 billion deal to fully acquire a company at an EV/sales multiple of 100 times. Activist investors revolted against Salesforce for less than that, while Adobe's stock sold off sharply upon news of the Figma acquisition, which was at 50 times annually recurring revenue. In the event that Microsoft possibly attempts to buy the rest of OpenAI, we do not see it being blocked by lawmakers, as it would clearly be preferable to a takeout attempt by Baidu, for example, and Alphabet already owns Deepmind. Additionally, there are dozens of AI startups and established companies creating foundational models.

Exhibit 19 Microsoft Summary Model

Microsoft (MSFT)

★★★

Last Price	Fair Value	Uncertainty	Stewardship	Economic Moat	Moat Trend	Morningstar Credit Rating
306 USD	325 USD	Medium	Exemplary	Wide	Stable	N/A

Analyst	Dan Romanoff	Five-Star Price	227.50	Estimated COE	9.0%	Adjusted P / E	32.0	34.0
Phone & Email	312 244-7816	Fair Value Estimate	325.00	Pre-Tax Cost of Debt	5.5%	EV / Adjusted EBITDA	20.1	21.4
	dan.romanoff@morningstar.com	One-Star Price	438.75	Estimated WACC	8.8%	EV / Sales	10.6	11.2
Sector	Technology	Market Price	306.00	ROIC *	36.7%	Price / Book	11.0	11.7
Industry	Software - Infrastructure	P / FVE	0.94	Adjusted ROIC*	51.6%	FCF Yield	3.2%	3.0%
				*5-Yr Projected Average		Dividend Yield	0.9%	0.8%
						(2023 Estimates)	(Price)	(Fair Value)

All values (except per share amounts) in: USD Millions	3-Yr Historical CAGR/AVG	2022	Forecast 2023	2024	2025	2026	2027	5-Yr Projected CAGR/AVG
Income Statement								
Revenue		198,270	211,223	233,995	259,042	286,247	315,253	
Gross Profit		135,620	145,284	160,989	178,739	200,373	222,254	
Operating Income		83,383	87,800	97,342	109,316	123,373	137,135	
Net Income		72,738	71,340	80,307	89,745	101,283	112,580	
Adjusted Income		69,447	71,340	80,307	89,745	101,283	112,580	
Adjusted EPS		9.21	9.55	10.81	12.17	13.83	15.48	
Adjusted EBITDA		105,345	110,855	122,953	137,708	153,373	168,363	
Growth (% YoY)								
Revenue	16.4%	18.0%	6.5%	10.8%	10.7%	10.5%	10.1%	9.7%
Gross Profit	17.8%	17.1%	7.1%	10.8%	11.0%	12.1%	10.9%	10.4%
Operating Income	24.7%	19.3%	5.3%	10.9%	12.3%	12.9%	11.2%	10.5%
Net Income	22.8%	18.7%	-1.9%	12.6%	11.8%	12.9%	11.2%	9.1%
Adjusted EPS	24.7%	15.5%	3.7%	13.2%	12.6%	13.7%	11.9%	10.9%
Adjusted EBITDA	21.1%	20.1%	5.2%	10.9%	12.0%	11.4%	9.8%	9.8%
Profitability (%)								
Gross Margin	68.4%	68.4%	68.8%	68.8%	69.0%	70.0%	70.5%	69.4%
Operating Margin	40.2%	42.1%	41.6%	41.6%	42.2%	43.1%	43.5%	42.4%
Net Margin	34.7%	36.7%	33.8%	34.3%	34.6%	35.4%	35.7%	34.8%
Adjusted EBITDA Margin	51.7%	53.1%	52.5%	52.5%	53.2%	53.6%	53.4%	53.0%
Return on Equity	44.8%	47.2%	38.1%	34.8%	32.5%	31.0%	29.1%	33.1%
Adjusted ROIC	53.7%	50.1%	47.3%	48.8%	51.0%	54.2%	56.6%	51.6%
Adjusted RONIC	65.6%	21.5%	73.2%	63.2%	97.4%	101.6%	95.0%	86.1%
Leverage								
Debt / Capital	29.0%	23.0%	17.5%	14.4%	11.8%	9.3%	7.3%	12.1%
Debt / EBITDA	0.7	0.5	0.4	0.4	0.3	0.2	0.2	0.3
EBITDA / Interest Expense	NM	(293.8)	(339.1)		(1,024.0)	(1,032.0)	(1,028.1)	NM
FCFE / Total Debt	1.00	1.31	1.67	2.03	2.45	3.04	3.74	2.59
Cash Flow								
Dividends per Share		2.48	2.68	2.88	3.08	3.28	3.48	
Free Cash Flow to the Firm		32,495	74,311	66,821	92,883	105,086	116,724	
FCFE (CFO-Capex)		65,149	73,563	86,379	98,108	110,992	123,416	
Dividend Franking		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Dividend Payout Ratio		25.7%	28.1%	26.6%	25.3%	23.7%	22.5%	

Source: Morningstar. Data as of May 1, 2023.

Research Methodology for Valuing Companies

Overview

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

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

Four key components drive the Morningstar rating:

- our assessment of the firm's economic moat.
- our estimate of the stock's fair value.
- our uncertainty around that fair value estimate.
- the current market price.

This process ultimately culminates in our single-point star rating.

Economic Moat

The Morningstar Economic Moat Rating is a structural feature that Morningstar believes positions a firm to earn durable excess profits over a long period of time, with excess profits defined as returns on invested capital above our estimate of a firm's cost of capital. The economic moat rating is not an indicator of the investment performance of the investment highlighted in this report. Narrow-moat companies are those that Morningstar believes are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those that Morningstar believes will earn excess returns for 10 years, with excess returns more likely than not to remain for at least 20 years. Firms without a moat, including those that have a substantial threat of value destruction-related risks related to environmental, social, and governance; industry disruption; financial health; or other idiosyncratic issues, are more susceptible to competition. Morningstar has identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

Fair Value Estimate

Each stock's fair value is estimated by using a proprietary discounted cash flow model, which assumes that the stock's value is equal to the total of the free cash flows of the company is expected to generate in the future, discounted back to the present at the rate commensurate with the riskiness of the cash flows. As with any DCF model, the ending value is highly sensitive to Morningstar's projections of future growth.

Fair Value Uncertainty

The Morningstar Uncertainty Rating represents the analysts' ability to bound the estimated value of the shares in a company around the fair value estimate, based on the characteristics of the business underlying the stock, including operating and financial leverage, sales sensitivity to the overall economy, product concentration, pricing power, exposure to material ESG risks, and other company-specific factors. Based on these factors, analysts classify the stock into one of several uncertainty levels: Low, Medium, High, Very High, or Extreme. Our recommended margin of safety—the discount to fair value demanded before we'd recommend buying or selling the stock—widens as our uncertainty of the estimated value of the equity increases.

Market Price

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

Morningstar Rating for Stocks

The Morningstar Rating for Stocks is a forward-looking, analyst-driven measure of a stock's current price relative to the analyst's estimate of what the shares are worth. Stock star ratings indicate whether a stock, in the equity analyst's educated opinion, is cheap, expensive, or fairly priced. To rate a stock, analysts estimate what they think it is worth (its "fair value"), using a detailed, long-term cash flow forecast for the company. A stock's star rating depends on whether its current market price is above or below the fair value estimate. Those stocks trading at large discounts to their fair values receive the highest ratings (4 or 5 stars). Stocks trading at large premiums to their fair values receive lower ratings (1 or 2 stars). A 3-star rating means the current stock price is close to the analyst's fair value estimate.

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Please note that investments in securities are subject to market and other risks, and there is no assurance or guarantee that the intended investment objectives will be achieved. Past performance of a security may or may not continue in the future and is no indication of future performance. A security investment's return and an investor's principal value will fluctuate so that, when redeemed, an investor's shares may be worth more or less than their original cost.

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