Age of AI

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Artificial Intelligence (AI) is a key pillar of the digital transformation theme, which is driving significant disruption and spurring new growth. Grant Bowers, portfolio manager with Franklin Equity Group, offers a unique perspective of the challenges and benefits of this evolving and disruptive technology.

For decades, the idea of computers seemingly becoming sentient and engaging with humans was incorporated in comics, books, television and movies. These computers and animatronic figures played games, controlled spacecraft, and generally sought to ease the lives of those with whom they interacted. These fictional characters were largely based on technology that was developing concurrently with the rise of media. While to many of us they seemed like fanciful characters at the time, we believe these ideas are now entering the mainstream reality of our day-to-day lives, bringing new opportunities for growth and productivity across a wide range of industries.

AI technology has been in development since the 1950s, but it wasn't until the late 1990s that it started to become more widely used. Early forms of AI in the 2000s focused on business intelligence and machine learning and saw rapid enterprise adoption. Since 2017, AI adoption has more than doubled globally (Exhibit 1) as companies have embraced the potential that the technology unlocks. The increase in computing power and ability to analyze large data sets and build predictive models has been a tremendous driver of productivity gains not just for the technology sector, but for every industry around the globe.

The next wave of AI has arrived and is driven by natural language models, like the recently released Generative Pre-Trained Transformer (i.e., ChatGPT). These models combine large amounts of data and computing power to string together words in a meaningful way. They understand words in context and have a vast vocabulary and information. They bring the promise of AI to act as an assistant for many human tasks closer, than ever before.
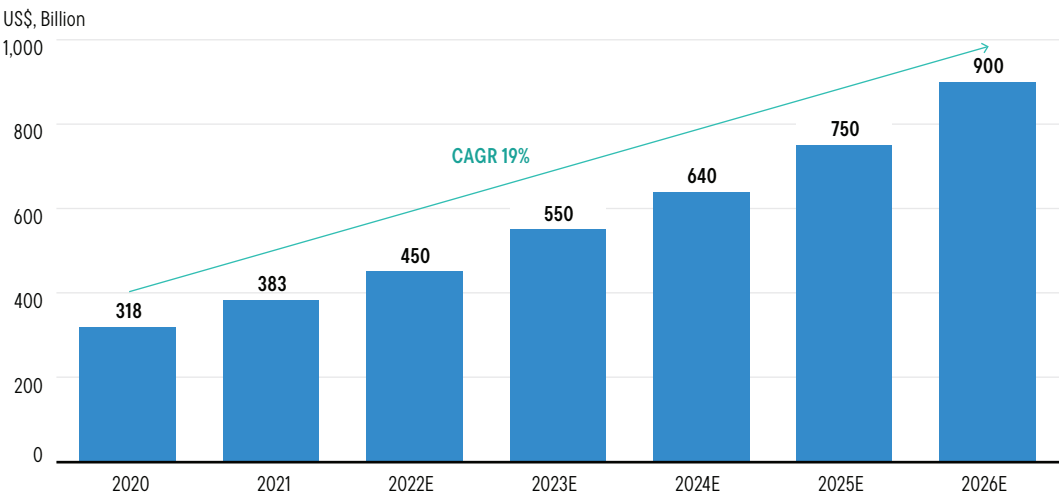
What is ChatGPT?

In late 2022, OpenAI, an artificial intelligence company that was founded in 2015 by several technologists including Elon Musk and Sam Altman, released its latest version of their AI platform ChatGPT. The platform uses Open AI's GPT language technology and can understand and create human-like conversation. The platform quickly reached over 1 million users in one week and Microsoft CEO Satya Nadella called it "the biggest technological platform of the generation."

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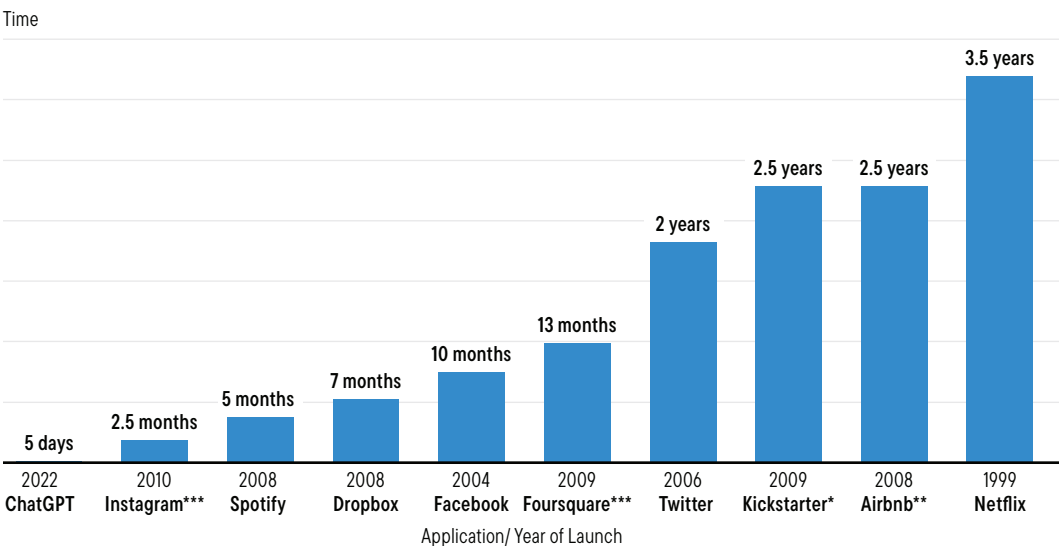## The Explosive Growth of AI

Exhibit 1: Global AI Market Size, Actuals and Forecast
2020–2026E

US$, Billion

CAGR 19%

Year	Value
2020	318
2021	383
2022E	450
2023E	550
2024E	640
2025E	750
2026E	900

Note: Global AI market includes AI Software, AI Hardware and AI Services.

Sources: BofA Global Research, IDC, September 2022. There can be no assurance that any estimate, forecast or projection will be realized.

ChatGPT could be the biggest technological platform of the generation

Exhibit 2: Time to Reach One Million Users for Various Applications
January 2023

Time

Application/ Year of Launch	Time
2022 ChatGPT	5 days
2010 Instagram***	2.5 months
2008 Spotify	5 months
2008 Dropbox	7 months
2004 Facebook	10 months
2009 Foursquare***	13 months
2006 Twitter	2 years
2009 Kickstarter*	2.5 years
2008 Airbnb**	2.5 years
1999 Netflix	3.5 years

Source: Statista. Note: *One million backers, **one million nights booked, ***one million downloads.

ChatGPT is a natural language model developed by Open AI, which is based on the GPT architecture. The model has been trained on a massive amount of text and data from the internet, books, and conversations. It can understand a wide variety of topics and can perform a wide range of natural language processing tasks such as text generation, text summarization, question answering and language translation. The model has been praised for its ability to predict what word should be next in a sentence and to generate human-like text, which makes it ideal for use in chatbots. ChatGPT is continuously learning, allowing for ongoing improvement in its ability to generate relevant content.

An example of this evolution can be exemplified through automated customer service chat bots—currently, when customers interact with a chatbot on a website, the chatbot generally uses canned responses when customers are initiating a return, trying to change their cable services, trying to purchase airline tickets, etc. These chatbot experiences are stilted in nature and have limited information scope. ChatGPT and other related large language

models (LLMs) advancements could improve the fluency of communication between humans and computers with a broad set of applications, like automatically providing transcripts of work meetings, creating schedules to increase productivity in workplaces and drafting emails.

Economic impact and the AI investment universe

The potential market for AI is enormous, as the technology has the potential to disrupt a wide range of industries (Exhibit 3). PWC estimates that AI could contribute up to US$15.7 trillion to the global economy by 2030,[1] more than the combined output of China and India. The following will likely drive the primary economic impact:

- Productivity gains from businesses automating their processes (including the use of robots and autonomous vehicles).
- Productivity gains from businesses augmenting their existing labor force with AI technologies.
- Increased consumer demand from the availability of personalized AI enhanced products or services.

AI Has the Potential to Disrupt a Broad Array of Industries

Exhibit 3: Projected Gains in Global GDP in 2030 Resulting from AI by Industry Sector

% of GDP

■ GDP Gains Associated with Productivity ■ GDP Gains Associated with Product Enhancements
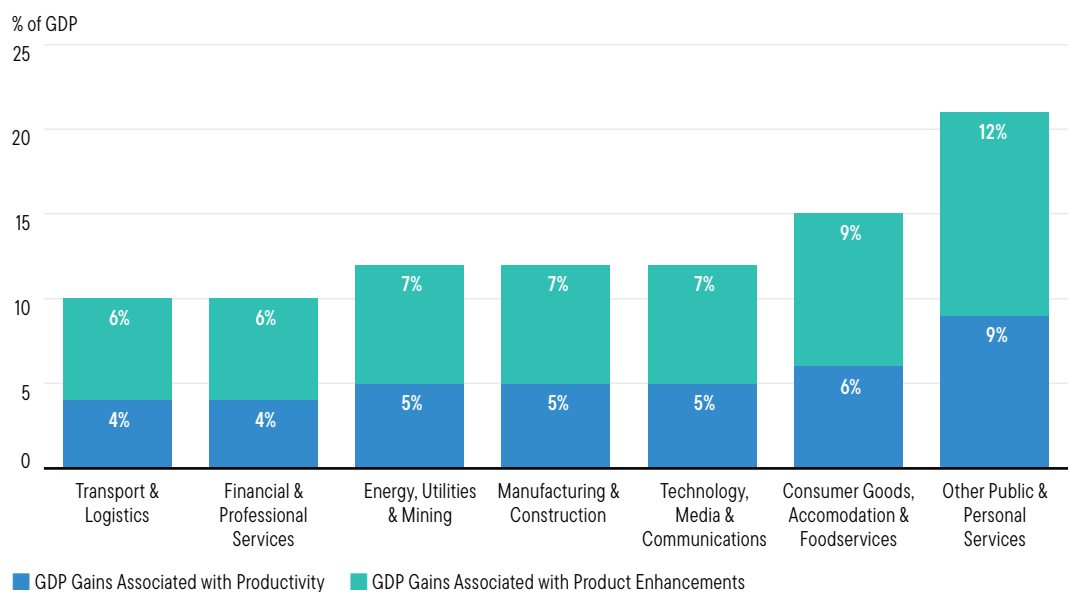
Sources: BofA Global Research, PwC Analysis. 2018 survey. There can be no assurance that any estimate, forecast or projection will be realized.

What industries might be disrupted first?

Artificial and machine learning should be thought of as "enabling technologies"—in other words, technology that must be paired with something else to be useful. We believe that these models will be disruptive to a multitude of sectors, and we see massive opportunity in how sectors may incorporate AI for greater productivity potential.

Companies are just starting to think about how to leverage this technology to foster improvements in their business models and customer engagement. Just as the launch of the iPhone in 2007 unleashed the last great technology shift to mobile, we expect a wave of productivity improvements to be seen across the entire market (Exhibit 4).

Exhibit 4: AI Adoption by Industry and Function
2021

	Human Resources	Manufacturing	Marketing and Sales	Product and/ or Service Development	Risk	Service Operations	Strategy and Corporate Finance	Supply-chain Management
All Industries	9%	12%	20%	23%	13%	25%	9%	13%
Automotive and Assembly	11%	26%	20%	15%	4%	18%	6%	17%
Business, Legal, and Professional Services	14%	8%	28%	15%	13%	26%	8%	13%
Consumer Goods/Retail	2%	18%	22%	17%	1%	15%	4%	18%
Financial Services	10%	4%	24%	20%	32%	40%	13%	8%
Healthcare Systems/Pharma and Medical Products	9%	11%	14%	29%	13%	17%	12%	9%
High Tech/ Telecomm	12%	11%	28%	45%	16%	34%	10%	16%

% of Respondents (Function)

Note: Conditional formatting based on the percentage of respondents in the survey.
Source: AI Index Report 2022, HAI Stanford University, McKinsey & Company, 2021.

Health Care

The health care sector is one area that could see significant change from the new AI models.

• Democratized health care access: Generative AI and its user-friendly interface has the ability to democratize access to health care for patients by analyzing symptoms and providing personalized treatment plans. This can improve the quality of patient care and reduce health care costs.

• Improved patient care and drug development: AI can also improve the standard of patient care by being the primary point of review for standard tests such as X-rays, lab results, drug development and MRIs. A hypothesis-driven discovery method currently drives drug development, which is both a time- and money-extensive endeavor. However, AI could enable analysis of large swaths of data to expedite and enhance the research and development process. One company used AI to observe the progress of various cancers by following data from cancerous and non-cancerous cells created. Other companies are investigating how to integrate machine learning into their research processes by using predictive technology to determine how potential drugs could impact the body, and then filter out less-effective compounds before lab work begins.[2]

Technology

Large language models could be very disruptive to several areas of the technology sector.

• Internet search: Even though many people may use the same internet search provider, each person's internet experience could be vastly different, due in part to AI learning of people's tendencies and creating a tailored experience. Traditional online search is one of the areas the arrival of generative AI may transform. The current search model is advertising-driven; in other words, what shows up at the top of a user's search may not always match exactly what that individual is looking for, because it's paid content. Generative AI technology offers a more conversational model able to deliver search answers directly to the user, using a language model to retool how search engines rank and serve relevant information.

- Coding and software development: Recently released software programming copilot products such as Microsoft's GitHub Copilot and Deep Mind's AlphaCode leverage large language models to act as assistants or guides for software development—automating and improving code quality. We believe that there could be a transformation in the coding landscape, transforming a currently labor-intensive exercise to a more automated one. In the years ahead, we see these copilot products being integral to the coding and software development process.

Retail and customer service
Anticipating customer needs and streamlining the service pipeline.

- Retailers are beginning to use AI to anticipate demand and, taking it a step farther, to use deep learning to predict customers' orders in advance. We believe this will drive more on-demand customization for consumers. This AI-driven customization should contribute to improvements in customer loyalty, which ultimately drives a virtuous circle of more demand.

- AI-driven chatbots are poised to disrupt the customer service industry. With the ability to provide instant responses to queries, chatbots can reduce wait times and improve overall service levels at lower cost. The travel, transportation and retail industries have been early adopters of AI technology and will embrace the new abilities GPT (and other LLMs) bring.

Automotive, transportation and education
Improving autonomous driving and new learning experiences.

- Autonomous or semi-autonomous driving will be built on the backbone of AI. Currently we see many driver assistance or collision avoidance systems utilizing AI. In the not-too-distant future, we expect to see autonomous ride sharing fleets in cities and large trucking companies using AI to manage transportation networks.

- The education sector could see disruption as large language models provide students with personalized learning experiences, answering questions or even writing papers for them. It also opens the door for teachers and students to rethink core skills instruction and development to identify and reinforce conceptual learning without over-reliance on these new tools.

Investment opportunities in AI

In our view, structural shifts in the technology landscape often create attractive investment opportunities for long-term investors who can position portfolios to take advantage of these shifts. AI represents a set of technologies, but many wonder how to invest in it. AI is under development at multiple large companies for a variety of purposes, including most large technology and technology-related companies, either as standalone products or as ways of improving existing products and business processes. Machine learning (ML) technology—a branch of artificial intelligence that enables computers to emulate how humans learn and adapt by using data and experience—is also under development at many companies, including semiconductor industry players situated at the core of ML/AI computing power. Additionally, as technology generally becomes more pervasive across industries, companies outside of the traditional information technology sector may have exposure to or are investing in AI.

Below are a few examples of areas of opportunity we see.

	Big Data/ Analytics	Companies that assist with data aggregation and analysis should benefit as the size and scale of data grows exponentially.
	Semiconductors and Equipment	The exponential growth of AI could usher in a new era of semiconductor architecture and computing platforms that can handle the growing demands of an AI-focused world.
	Cloud Computing	Public and private cloud platforms are the backbone of harnessing the massive amounts of data required to operate the AI processes.
	Software	Generative AI will be integrated into a wide range of software platforms to bring better solutions to customers.

Long-term opportunities

The "Age of AI" is fast approaching, and we believe that these changes will make AI integral to everyday life, interwoven in how we interact with computers. However, like many technologies, we believe the adoption will be moderate at first and build over time. Technology will continue to improve. Investment will grow, and more applications will be built on the platforms. Enterprises and consumers will realize the benefits of the tools built based on this new technology. We are excited by the tremendous opportunities that AI, ChatGPT and other large language models bring and will continue to search for opportunities for our strategies to invest in the revolution.

There are also risks in investing. The initial potential of any asset class may not carry over to any specific company or the entire asset class chosen for investment, over any time period. Any of the stated assumptions may or may not come to fruition, and any companies referenced may or may not have future successes. Investors should be prepared for potential losses as well as the possibility of investment gains. Ideas, products, companies, themes or entire asset classes with positive attributes are not indicative of future results. Discussions should not be regarded as any type of trading recommendation, or as a signal about any past, current or future trading activity in any fund or strategy, by Franklin Templeton and its affiliates.

Endnotes

1. Source: Rao, Anand S. Verweij, Gergard. "Sizing the prize. What's the real value of AI for your business and how can you capitalize?" PWC 2017.
2. Source: "Artificial Intelligence in Health Care." GAO. December 2019.

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