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How to Invest in AI: Getting Ahead of the Curve

Jelissa Jonas
Providence College

Madison Keka
Wake Forest University

Conner Fitzpatrick
Williams College

Lucas George
Davidson College

Michael Wangerman
Providence College

Introduction:

The rapidly evolving field of artificial intelligence (AI) is reminiscent of the jump in innovation last seen in the 1990s with the introduction of the internet. In the 1990s technology stocks outperformed other sectors as investors began to see the potential of the internet. As a result of excessive investor enthusiasm, stocks became increasingly expensive; only later did investors understand that many internet-related stocks were unable to fulfill expectations for long-term growth. The dot-com bubble burst in March 2000 as the Nasdaq Composite index declined by up to 80% over the following two years.[1]

The investor experience with the boom-and-bust dot-com cycle of two decades ago highlights the promises and pitfalls that investors face today as they allocate capital to AI companies. How can investors best access AI companies while mitigating downside risks often attendant upon any new and evolving technology? This paper will examine different methods to invest in AI, including single stock investments, exchange traded funds (ETFs), and private markets. Each has advantages and disadvantages, but each also gives investors exciting opportunities to participate in this new and expanding technological revolution. As AI continues to change and advance, investors must understand its capabilities and limitations to fully evaluate the risk and reward that investing in the industry presents. Without a dedicated evaluation of the space, investors might miss out on all that AI has to offer.

Recently, Goldman Sachs' top stock analyst, Jim Covello, expressed skepticism about the long-term impact of AI, and he feels that the technology will not bring about the next economic revolution even with all the money pouring in.[2] In contrast, Jordan Jacobs, cofounder of Radical Ventures, a Toronto-based venture capital firm specializing in AI, believes in the potential of AI. Jacobs argues that AI will replace every type of software over the next decade, and he values the industry at trillions of dollars.[3] By applying the lessons of the dot-com era and staying informed about this dynamic industry, investors can make well-balanced decisions that weigh both caution and potential.

The term "artificial intelligence" was first coined in the 1950s, and the field has evolved since, driving innovation and change.[4] Tasks historically performed by humans, such as decision-making, reasoning, and problem-solving, are now becoming more

computerized.[5] Early examples of AI use include Netflix's recommendations for television shows and movies, Google's translations between languages, and computer apps playing chess with human opponents.[6] Artificial general intelligence (AGI) is considered an advanced evolution of AI. The ability for computers to achieve or succeed at a level of human intelligence is referred to as AGI, which is synonymous with the term "strong AI." For example, the science fiction film Ex Machina (2014) follows Ava, an AGI who ultimately uses reasoning, deception, and self-awareness to kill two individuals. Depicting AGI of this nature in media raises fears and concerns about this industry, yet AGI is still far off from the AI accessible today.[7] In the near term and in its current form, AI allows for increased accuracy, decreased operational costs, personalization, improved decision-making, and quicker turnaround of work. These benefits are balanced by some concern that AI will pose job losses, present a potential for bias, create cybersecurity concerns, and lead to misinformation or legal risks.[8] But given the transformative nature of the industry, there are significant investment opportunities in this space that investors are encouraged to explore.

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Innovations in AI & AI Infrastructure

Earlier generations imagined a world where machines could not only listen to commands but also anticipate human needs, where new algorithms transformed industries, and where technological innovation could overcome human limitations. Today, artificial intelligence has fulfilled these dreams and more, emerging as the revolutionizing force of our century. AI has made its way out of sci-fi novels and into everyday life, reshaping homes, hospitals, classrooms, and the workforce, forever altering the ways in which people behave.

Industries at large are reaping major benefits from the introduction of AI, and are leveraging the speed and efficiency that it offers to make larger impacts on the world. Based on our research we have developed unique definitions of primary and secondary beneficiaries to categorize the areas of opportunities within the AI space. The term beneficiary, as traditionally used, describes an entity that derives benefit from a service or innovation. In this frame of reference, primary beneficiaries of AI represent a smaller and more comprehensive category of companies that directly create and innovate the core AI technologies, as well as those that provide the infrastructure to support the development of AI. They benefit through the generation of revenue and being a leader in the AI innovation space. They invest in the development of AI algorithms, data processing, and machine-learning models. Conversely, secondary beneficiaries of AI are companies in other industries leveraging AI to improve their internal processes, customer service and the reach of their businesses. They benefit through the application of AI, leading to increased operational efficiency and competitiveness.

Healthcare Industry

Within the healthcare industry, AI is providing innovation in research, diagnostics, and treatment, directly improving the lives of patients and their outcomes. A study published in Frontiers in Artificial Intelligence highlights how AI is affecting clinical medicine: "The integration of AI in healthcare offers significant advantages over traditional medical practice, particularly in terms of the learning curve and time efficiency [...] AI systems can 'learn' and improve their performance through machine learning, [...] surpassing the rate at which a human physician could acquire the same knowledge."[9] This speed and efficiency are life savers in the context of the laborious demands of charting, researching, and the more direct lifesaving aspects of developing diagnoses in difficult cases demanding urgent solutions.

Automotive Industry

Similarly, the rise of automated transport is revolutionizing the automotive industry made possible by technological advancement in AI. The most notable case is Tesla, which came out with its autopilot feature in cars in 2015. Since that time major automobile companies such as Waymo (formerly Google's Self-Driving Car Project), Ford, and General Motors have followed suit, contributing to a now growing and competitive market with more innovation to follow. Of course, this AI-enabled innovation creates a potential leading investment opportunity, since firms can ultimately drive profits higher with these technological advancements.

Retail Industry

The retail industry is also adopting the use of AI both virtually and in physical locations to enhance the consumer experience as generative AI becomes an efficient way to cut costs. Chatbots are replacing countless customer service representatives. eMarketer estimates that 49% of the United States population have used a chatbot for customer service this past year alone[10].The research of Song et al. provides compelling insight into this change in the retail industry: Using a tiered approach to allow chatbots and human beings to work together, with chatbots acting more as a supplement to human beings than as a replacement, to meet the diverse need of users.[11] This finding supports the growing conclusion that AI supplement human experience and is permanently changing the way we handle interactions across a multitude of sectors.

Personal Life

Beyond its role in industry, AI has a more personal effect on the daily lives of every individual, promoting simultaneously more productive and more relaxing lifestyles. From automating everyday chores to enhancing creative projects, AI is being stitched into the fabric of human interactions. Generative AI refers to deep-learning models that can generate high-quality text, images, and other content based on the data the AI was trained on.[12] ChatGPT, the first publicly available generative AI, caused a gigantic stir when the company OpenAI released it in November 2022. ChatGPT offers more accuracy and detail than legacy home systems, such as Alexa, Google Home, and Siri. ChatGPT has become a tool for every person—professionals drafting emails, students needing tutoring, or busy moms organizing their schedules. With the widespread adoption of this technology, even more companies are embedding generative AI in their applications and software. Leading social technology company, Meta, integrated the system into its social media apps—Facebook, Instagram, and WhatsApp—further personalizing content search and improving communication and user assistance. The sheer accessibility of AI has transformed the management of daily life, allowing efficiency within the home and making itself an almost essential aid to human activity.

AI Infrastructure

At the core of AI's transformation lies its robust infrastructure, the power source that fuels its various capabilities. According to Run AI, the AI ecosystem is comprised of five components, Data Storage and Management, Compute Resources, Data Processing Frameworks, Machine Learning Frameworks and Machine Learning Operations Platforms.[13] Data is the blood of AI systems, essential to all its functions and growth. As such the storage and management of that data is a critical element to maintaining the integrity, efficiency, and scalability of all AI applications. This surfaces in the build out of data centers and cloud-based storage, helping to effectively organize the mass of data in our world. Compute resources are the chambers that channel the workload of AI processing successfully, as AI can only function through the computational powers that fuel it. The frameworks of AI, both data processing and machine learning, provide the structure needed to further refine algorithms, allowing raw data to become actionable output. The last component, MLOps are the delivery systems of AI, that streamline machine learning models to production.[14] These infrastructure components offer attractive opportunities for investment.

Investing in AI

All of this innovation creates opportunities for investors wishing to participate in the AI revolution. Can investors develop a method to determine the winners and losers? Or should they adopt a broader approach and seek general industry

exposure, without taking on too much stock-specific risk? What opportunities are there in the private markets? We explore these questions next as we analyze investing in different markets relevant to the AI revolution: stocks, exchange-traded funds (ETFs), and private markets.

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Stock Market

Individual stock investments come with the potential for high upside returns and allow for customized portfolio holdings, but they carry heavy risk. Harry Markowitz, the father of modern portfolio theory, is attributed to saying "diversification is the only free lunch" in reference to his 1952 dissertation in which he proves diversification allows for less risk without compromising expected returns.[15] Still, it is easy to see the success of stocks like Nvidia and want to join in on the success. But for every Nvidia there are dozens of other stocks that do not pan out. Simple investors find it difficult to assign a future value to a single company or technology. The evaluation of individual stocks in this space poses a challenge. Traditional multiples valuation methods can lead to significantly different estimates of intrinsic valuation. Additionally, discounted cash flow (DCF) analysis depends heavily on assumptions that can change significantly as the growth of AI accelerates. Not only must an analyst assess a particular firm's ability to deliver on AI technology, but the investor also needs to understand that broader AI market when assessing the growth prospects for an individual firm.

Although DCF models can be computationally complex, simpler models that use market multiples carry their own drawbacks. Multiples valuation methods are backward looking and lack specificity and adjustability compared to DCF models. Multiples models rely on previous data to calculate current metrics and future growth. Additionally, not all metrics are held to the same standards. Consider a company like SentinelOne, a cybersecurity company that uses AI to prevent, detect, and respond to threats autonomously and faster than ever before. SentinelOne does not have positive earnings, so it has no P/E ratio to evaluate, but other metrics like price-to-sales ratios can sometimes be used instead. Yet, market multiples based on sales are less standard and do not provide the same level of confidence.

We illustrate the challenge of assessing an individual stock in this space by building a DCF model for a single stock. A DCF model estimates the intrinsic value of a company by estimating the present value of a company's future cash flow. This involves projecting five to ten years of future free cash flows by making assumptions for a company's revenue growth, expenses, capital spending, and working capital and then discounting them back to the current value using a weighted average cost of capital that accounts for the risk factors for the company. The intrinsic value estimate from a DCF may depart significantly from the actual stock price, but the estimate can act as a guide to a company's valuation. A drawback of the DCF is that it places a high importance on the terminal value. The terminal value is estimated at the end of the horizon period and hence is subject to a higher level of forecast error than the near-term cash flows. An additional drawback is that a DCF analysis does not implicitly account for unexpected geopolitical events or the booms and busts of a global economy.

Nvidia is an example of a goldilocks company that is at the forefront of the AI boom while also having solid financials behind it, which makes the company's valuation extremely high. The H100 chip is currently the leading GPU (graphics processing unit) chip in the United States, with the high mathematical calculating power needed to render complex graphics; however, in the second quarter of 2024, Nvidia released its H200 chip, with double the computing power of the H100 chip.[16] Nvidia has claimed the lion's share of GPU sales in the United States with its H100 chip and is expected to further distance itself from competitors with the H200 chip as the GPU market continues to grow into a market that is estimated to hit $772 billion by 2032.[17] Nvidia has had an annualized revenue growth of 54% from 2021 to 2024 as well as a 115% annualized return during this same period.[18] This hot

growth, combined with excitement in the market, has propelled Nvidia's current P/E ratio to 75.8, compared to Microsoft's P/E of 39.3.[19]

In Exhibit 1 we show the results of a DCF analysis on Nvidia, where we calculate an intrinsic value of $115 per share, which was Nvidia's stock price at the end of July 2024. Reproducing Nvidia's July stock price allows us to infer what assumptions market participants are making. Here we show that in order to achieve this stock price consistently, Nvidia needs revenue growth of 31% per year for the next five years, and its cash flow margin to sales must remain at 46%.

Exhibit 1. DCF Model for Nvidia – July 2024

Assumptions and Calculations	
Rev Growth 2024 - 2028	31.0%
Terminal Growth	5.0%
FCF Margin	46.00%
WACC	9.76%
Net Debt	2,123
NCI	0

NVDA	Reported	Forecast Horizon					Terminal
($ millions)	Apr-24	2024	2025	2026	2027	2028	Period
Sales, unrounded	104,176	130,000	170,300	223,093	292,252	382,850	401,992
FCF Margin	46.21%	46.00%	46.00%	46.00%	46.00%	46.00%	46.00%
FCF Estimate	48,135	59,800	78,338	102,623	134,436	176,111	184,917

		1	2	3	4	5	
NVDA		Forecast Horizon					Terminal
($ millions)		2024	2025	2026	2027	2028	Period
FCF		59,800	78,338	102,623	134,436	176,111	184,917
Discount Factor		0.9111	0.8301	0.7563	0.6890	0.6277	
Pv of horizon FCFF		54,483	65,026	77,609	92,627	110,552	3,884,800
Cum PV of horizon FCFF	400,296						
PV of terminal FCF	2,438,643						
Total Firm Value	2,838,939						
Less Net Debt	2,123						
Less NCI	-						
Firm equity Value	2,836,816						
Shares Outstanding	24,620						
Stock Value / share	$ 115.22						

The future equity value is extremely sensitive to both the annual revenue growth rate and free cash flow (FCF) yield. This sensitivity is illustrated in Exhibit 2, where we run multiple scenarios at various levels of FCF margin and future revenue growth. Running numerous scenarios illustrates how sensitive the intrinsic value is to changes in the underlying assumptions. For example, Exhibit 2 shows a scenario in which Nvidia maintains an annual revenue growth of 50% ("Y" axis) and is able to increase its free cash flow margin to 55% ("X" axis) while keeping the weighted average cost of capital (WACC) constant over the next five years.These growth and margin inputs intersect at $230.68 per share, showing that in this model Nvidia should trade at that value. This a 100% increase over the July 2024 stock price. So, with a modest change in our model assumption, we arrive at a significantly different stock price. If an investor believes that this growth is likely, then Nvidia is a great buy at its current price. Of course, this growth can be difficult to sustain in a dynamic industry like AI, and we could potentially also see a decrease in growth and FCF margin instead. If Nvidia falls short of its projected metrics to a 20% annual growth rate and a 35% FCF margin, the stock price falls to $63.12 per share in five years, a 50% discount from the July 2024 stock price. A DCF model provides the mathematical tool to determine the future value of the company given specific market conditions. The risk is in estimating future market and business conditions for one single company. A lot of money can be made if projections are done correctly, but a plethora of unforeseeable factors can arise and disprove market predictions that underly the DCF. Picking individual stocks through DCF analyses is complex, risky, and time consuming and subject to modeling error. Most investors do not have the risk tolerance or time to choose individual stocks. In fact, because of the potential for modeling error, and the inability to model future unknowns, we feel that investors seeking exposure to AI investments should consider a more diversified investment vehicle, like exchange-traded funds, while minimizing stock-specific risk.

Exhibit 2. DCF Stock-Price Estimates for Nvidia, at Different Levels of Rev Growth and FCF Margin

		FCF Margin						
		30%	35%	40%	45%	50%	55%	60%
Rev Growth	20%	54.09	63.12	72.15	81.18	90.21	99.24	108.27
	25%	62.98	73.50	84.01	94.52	105.03	115.54	126.05
	30%	72.98	85.15	97.33	109.51	121.69	133.86	146.04
	35%	84.16	98.20	112.24	126.28	140.33	154.37	168.41
	40%	96.63	112.75	128.86	144.98	161.10	177.22	193.34
	45%	110.47	128.90	147.32	165.75	184.17	202.60	221.02
	50%	125.79	146.77	167.75	188.73	209.71	230.68	251.66
	55%	142.69	166.48	190.28	214.07	237.87	261.66	285.46
	60%	161.27	188.16	215.05	241.95	268.84	295.73	322.62

Individual AI companies offer extreme upside potential coupled with significant downward potential. Most existing companies will not grow into the next Nvidia; some will not even survive. It is important to perform due diligence not just on the growth of a given company, but also on the future of the subsector to which it belongs within the AI space. As technology advances, what is currently state-of-the-art technology will lag, and it is up to the leadership of each firm to maneuver through the ever-changing landscape. It is not only important to choose companies with sound leadership but also to choose business models and products that provide a level of protection against competition. We believe that investors should take Harry Markowitz's advice and avoid significant investment in single companies.

Exchange-Traded Funds

Exchange-traded funds (ETFs) allow investors to gain targeted exposure to specific market segments while diversifying away from stock-specific risk. Although common indexes such as the S&P 500 already provide AI exposure (with 36% of companies in the index mentioning AI in their Q4 2023 earnings calls[20]), we are focusing on a more dedicated allocation to the AI sector. Fortunately, asset managers are offering a wider range of ETF offerings in the AI space, providing diverse options for investors looking to capitalize on AI innovation. According to ETF.com, there are currently 40 ETFs listed as AI ETFs.[21] An AI ETF is an investment fund that focuses on companies involved in the development, research, and application of AI technologies. These ETFs aim to provide investors with exposure to companies utilizing, or building out, technology focused on machine learning, deep learning, natural language processing, and other AI-related technologies. Although this section does not cover every AI ETF, we will dive into three notable examples: the Invesco IGPT Invesco AI and Next Gen Software ETF (IGPT), the iShares Semiconductor ETF (SOXX), and the iShares U.S. Digital Infrastructure and Real Estate ETF (IDGT).

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The Invesco IGPT ETF has $374 million in assets under management (AUM) and an expense ratio of 0.60%. This ETF seeks to track an index of large- to small-cap companies from developed and emerging markets that derive at least 50%

of their revenue from subsectors related to future software development. The component securities are expected to benefit from long-term structural trends driven by technological and societal change, which may significantly impact their performance. Key holdings of the IGPT ETF include Nvidia (8% of holdings) and Advanced Micro Devices, Inc. (AMD) (8% of holdings).[22] These companies are primary beneficiaries of AI innovation, positioning this ETF to profit from their growth for years to come.

The iShares Semiconductor ETF (SOXX) has $14 billion in AUM and an expense ratio of 0.46%. The SOXX ETF tracks the NYSE Semiconductor Index, which includes the 30 largest U.S.-listed semiconductor companies based on market capitalization and liquidity. This index comprises manufacturers and service providers within the semiconductor industry, such as packaging and testing companies. Key distinctions and holdings of the SOXX ETF include Broadcom (10% of holdings) and Nvidia and AMD (each 7%–8% of holdings).[23] While SOXX and IGPT share some holdings, SOXX is more focused on the secondary beneficiaries of AI, such as companies in the semiconductor sector that support AI technologies indirectly.

The iShares U.S. Digital Infrastructure and Real Estate ETF (IDGT) has $51 million in AUM and an expense ratio of 0.41%. The IDGT ETF targets companies involved in the infrastructure supporting digital data and services. This includes companies that store, process, transmit, and provide access to digital data, essential for the growth of digitization and AI. Key holdings of the IDGT ETF include Digital Realty Trust, American Tower, and Equinix.[24] These companies provide the essential infrastructure for AI technologies to function, making them secondary beneficiaries of AI growth. Exhibit 3[25] [26] compares some notable ETFs in the AI arena, including the three discussed above.

Exhibit 3. Exchange-Traded Funds Focusing on Artificial Intelligence

Market data current as of August 1, 2024[25,26]

Symbol	ETF Name	AUM ($M)	YTD Price Change (%)	Expense Ratio (%)	Weighting Methodology
SMH	VanEck Semiconductor ETF	21,830	37.42	0.35	Market-cap
SOXX	iShares Semiconductor ETF	14,510	23.64	0.46	Market-cap
XT	iShares Exponential Technologies ETF	3,373	-1.96	0.47	Equal-weighted
BOTZ	Global X Robotics & Artificial Intelligence ETF	2,760	10.63	0.68	Market-cap
AIQ	Global X Artificial Intelligence & Technology ETF	2,085	10.87	0.68	Market-cap
XSD	SPDR S&P Semiconductor ETF	1,561	10.15	0.35	Equal-weighted
IRBO	iShares Robotics and Artificial Intelligence ETF	640	-3.32	0.47	Equal-weighted
ROBT	First Trust Nasdaq Artificial Intelligence & Robotics ETF	499	-5.97	0.65	Modified equal
IGPT	Invesco AI and Next Gen Software ETF	396	14.69	0.6	Market-cap
QTUM	Defiance Quantum ETF	285	13.45	0.4	Modified market-cap
IETC	iShares U.S. Tech Independence Focused ETF	269	18.53	0.43	Market-cap
WTAI	WisdomTree Artificial Intelligence and Innovation Fund	253	-3.91	0.45	Modified equal
THNQ	ROBO Global Artificial Intelligence ETF	136	5.85	0.75	Modified equal
IDGT	iShares Digital Infrastructure and Real Estate ETF	51	12.76	0.41	Market-cap

Understanding the weighting methodology and targeted exposure of an ETF is crucial. In fact, in 2024 market-cap-weighted ETFs have outperformed equal-weighted ETFs because large companies with high market caps, such as Nvidia, which are included in these ETFs' portfolios, have driven returns. (see table). Conversely, if an investor expects increased competition or regulatory actions to negatively affect large firms, equal-weighted ETFs might be preferable. This is because equal-weighting gives smaller companies a proportionally larger role in the ETF's performance, preventing the fund from being overly reliant on the performance of big companies like Nvidia.

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For example, over the past year, Broadcom Inc. (AVGO) has experienced a substantial year-to-date (YTD) increase of 36%. This single stock has led to a significant performance boost for the iShares Semiconductor ETF (SOXX) and the SPDR S&P Semiconductor ETF (XSD), but the effects differ due to their allocation differences. SOXX, which is market-cap weighted, allocates about 9% to Broadcom, which contributes approximately 3.5% to the ETF's 24% YTD performance.[27] In contrast, XSD, which is equal-weighted, has a 3% allocation to Broadcom, resulting in only about a 1% contribution to its smaller overall YTD gain of 10%.[28] The different weighting of Broadcom between the SOXX and XSD ETFs highlights the significant differences in their approaches. SOXX's larger weighting in Broadcom is due to its focus on the semiconductor sector, where Broadcom is a major player with significant market capitalization. In contrast, XSD's equal-weighted allocation results in a smaller impact from any single company. *Market data current as of August 1, 2024

The inclusion of real estate infrastructure in ETFs like IDGT offers potential stability and lower risk compared to pure technology investments. Real estate assets, particularly those involved in digital infrastructure, provide steady income through long-term leases and are less volatile than technology stocks, making ETFs like IDGT a balanced investment option.

ETFs offer a diversified, lower-risk way to invest in the burgeoning AI sector. Yet differences in the selection criteria for inclusion of companies in the fund, the weighting methodology, and liquidity can create significantly different returns among these ETFs. Investors need to understand these differences before investing. With a variety of options available, from ETFs focusing on AI innovators to those supporting AI infrastructure, investors can choose the ETF that best aligns with their investment strategy and risk tolerance. Careful consideration of the weighting methodology and the specific focus of each ETF is essential to optimize investment outcomes in this dynamic and rapidly evolving field.

Private Markets

While individual investors can now access a wide variety of individual stocks and ETFs focusing on AI, institutional and high-net-worth investors are using private markets to increase their exposure to AI. Of course, private markets come with their own challenges, including less liquidity and less availability to the general public. Private equity (PE) funds buy and hold companies on behalf of their investors with the goal of exiting after creating substantial value. PE funds seek to add value by various means, including optimizing financial structures, incentivizing management, and creating operational improvements.[29] Creating value through operational improvements and restructuring takes time, making the asset class more illiquid. Additionally, this type of investment is typically accessible only to qualified institutional and individual investors. Larger investors such as pension funds, endowments, and insurance companies dominate PE markets. PE investors need to assume a long-term time

horizon; investors typically expect their money to be returned, with a handsome profit, within 10 years of committing their funds.[30] Investors are attracted to PE because of its unique ability to produce higher returns, lower volatility, and low correlation with traditional asset classes.

Significant investor interest in private equity has encouraged many companies to stay private. According to McKinsey, we have seen a 50% reduction in the number of publicly held companies since the late 1990s.[31] The number of IPOs has also been falling rapidly. With fewer companies to invest in, it becomes harder to find ways to generate higher returns. And while fewer IPO exits could impede investments in private markets, private investors are showing a strong appetite for PE. In fact, investments in AI have rapidly grown over the last year and will continue to do so as investors rush to get in early. Private equity investment surged to $927.7 million in the third quarter of 2023, up from $121.5 million recorded in the same period a year before.[32]

The use of AI is also being widely discussed by companies in other sectors since the use of AI for productivity has become widespread. The most popular form of private market investment in AI is venture capital (VC). Despite similarities between PE and VC, these two investments also have considerable differences. Venture capital comes into play when an investor provides funds to early-stage, speculative companies that have high growth potential. In contrast, most PE firms and funds invest in mature companies rather than startups.[33] The two investment strategies are not mutually exclusive, because many PE firms have their own venture capital projects. For example, General Atlantic is a PE company that has made investments in ByteDance, Evisort, PathAI, and other technology or specifically AI companies. Another firm in this space is Insight Partners, a VC and PE company whose investments in AI include Acceldata, Aquant, and AssemblyAI, among many other companies.[34]

There are many examples of VC investments in AI, the most notable being the massive investments in OpenAI, the company responsible for ChatGPT. Led by venture-capital firm Thrive Capital the most recent deal will boost OpenAI's valuation to over $80 billion, which has already received huge VC investments from other firms, such as $13 billion from Microsoft.[35] VC funding in general surged to $55.6 billion in the second quarter of 2024, a 47% jump from the first quarter of 2024. It is clear that this large increase in venture capital funding has been driven by demand for investments in AI. A few recent examples are the $6 billion raised by Elon Musk's xAI and the $1.1 billion raised by CoreWeave.[36] Reuters also mentions another recent big investment, the $8 billion raised by Anthropic, much of which came from Amazon and from venture capital firms.

> **"Despite the higher risk when investing in private markets, if investors are knowledgeable enough to find strong companies and projects, these investments can offer higher potential returns than investing in either individual stocks or ETFs."**

Another way in which private equity firms are investing in AI is by adding additional capital to their own portfolio companies to invest in their AI technologies. These are companies that a PE firm already partially owns but into which it invests additional money to encourage the use of AI, thus enabling greater operating efficiency. Such portfolio companies would fall among the secondary beneficiaries of AI. Because that category is much larger than the primary beneficiaries, its size offers PE firms many more opportunities to invest in their own companies. The ideal result is that such funding would lead to higher productivity and efficiency, allowing for these portfolio holdings to become more profitable.

Private markets offer a simultaneously high-risk and high-reward opportunity to invest in AI. Given that many more companies are staying private, especially in the technology sector, the current

moment seems to offer a perfect environment for better performance in private markets. As investors rush to get in on the bottom floor, VC projects and startups are receiving inflated valuations, further increasing risk in the space, especially for less qualified investors. Despite the higher risk when investing in private markets, if investors are knowledgeable enough to find strong companies and projects, these investments can offer higher potential returns than investing in either individual stocks or ETFs.

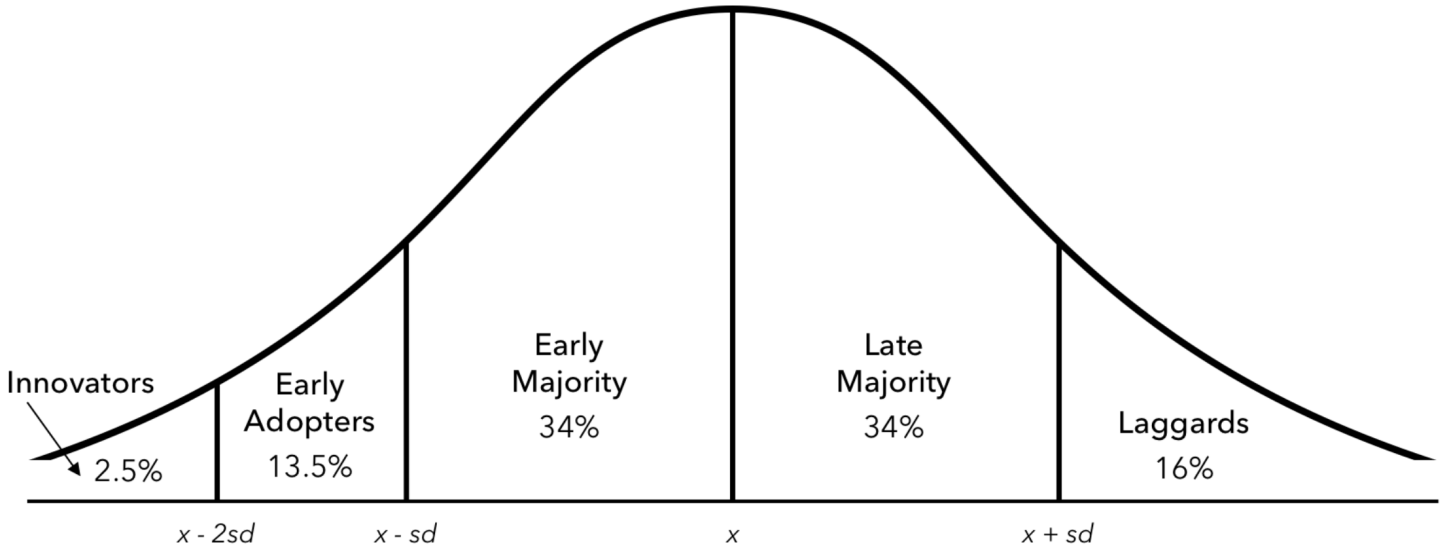
Conclusion

The Rogers curve, also referred to as diffusion of innovations theory, separates the users of new technology into five groups: innovators, early adopters, early majority, late majority, and laggards.[37] Exhibit 4 shows the typical percentages of users of a new technology that fall into each of the five groups of the Rogers curve. Currently, AI adoption is transitioning into the early majority stage.[38] Although AI is reaching a phase where it is being increasingly adopted, it is essential to highlight the incredibly dynamic nature of the field, which presents different investment approaches.[39] To capitalize on these opportunities, investors must stay informed about the rapidly evolving AI landscape and adapt their investment strategies accordingly.

Investing in AI by selecting individual stocks can offer significant upsides but carries great risk if investors allocate their capital to poorly performing stocks. We embrace the principle of diversifying one's investments and believe that ETFs provide a superior vehicle to gain exposure to AI. Taking the ETF route when investing in this space does offer diversification. However, investors must remain mindful of two things: weighting methodology and the targeted exposure. Investors should know if the ETF they are interested in is market-cap-weighted, equal-weighted, or a modified equal-weighted index, and what the ETF aims for in terms of its exposure. It is challenging for individual investors to enter private markets, yet opportunities in this space are growing for institutional investors and high-net-worth individuals. Investing in AI through PE presents high potential returns and diversification, yet this form of investing is typically associated with both illiquidity and risk.

Overall, we are in an immensely exciting time to be investors in such an innovative industry due to the incredible opportunities it offers and its potential. Investors should carefully weigh all factors in accordance with their own investment goals, risk tolerance, and time horizon when determining their personal approach to investing in artificial intelligence.

Exhibit 4. The Rogers Curve: Adopters of New Technology by Type



Relationship between types of adopters classified by innovativeness and their location on the adoption curve.
SOURCE: Everett M. Rogers, Diffusions of Innovations, 5th ed. (New York: Free Press, 2003), p. 281.

Authors' Note

The aim of this paper is to provide a comprehensive overview of the three main pathways available when choosing to invest in the AI landscape. Due to the rapid and ever evolving nature of the industry, making a specific investment choice can be challenging. Our hope with this opinion snapshot is to equip the average investor with a deeper understanding of the industry, enabling them to make more informed and confident investment decisions.

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