

MONTHLY RESEARCH WEBINAR

ARTIFICIAL INTELLIGENCE: INVESTMENT IDEAS IN THE AGE OF GENERATIVE AI

Moderator:

Jim Kelleher, CFA

Director of Research

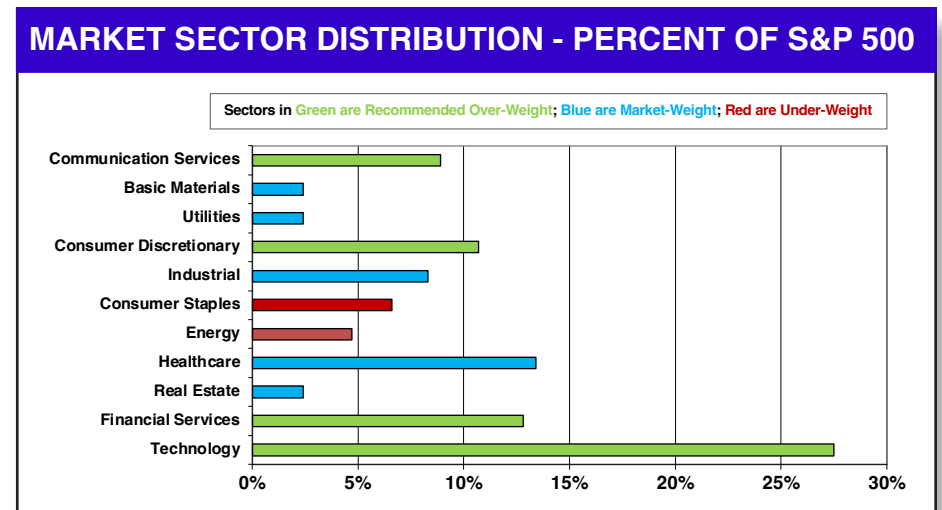
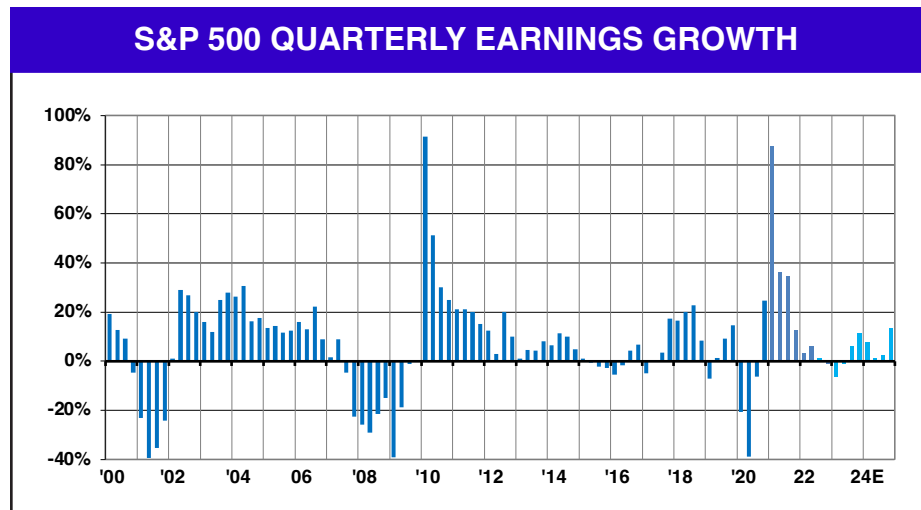
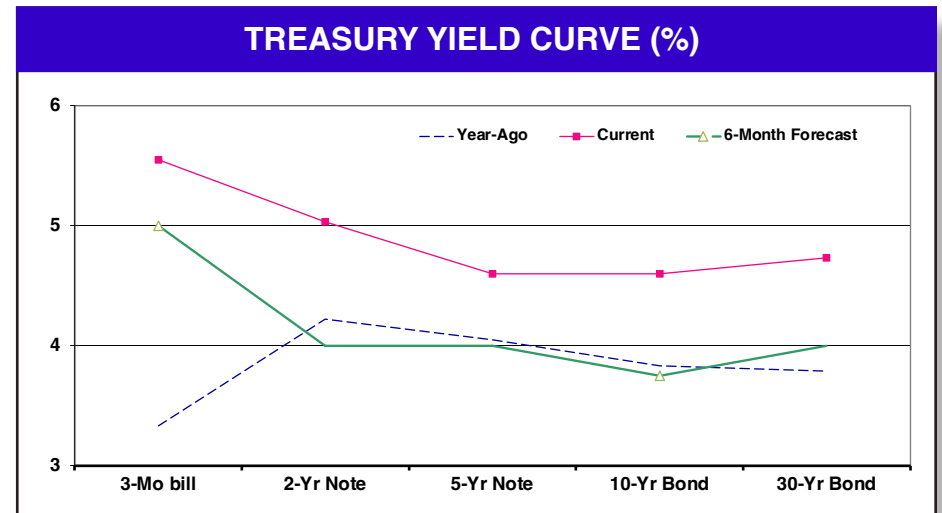
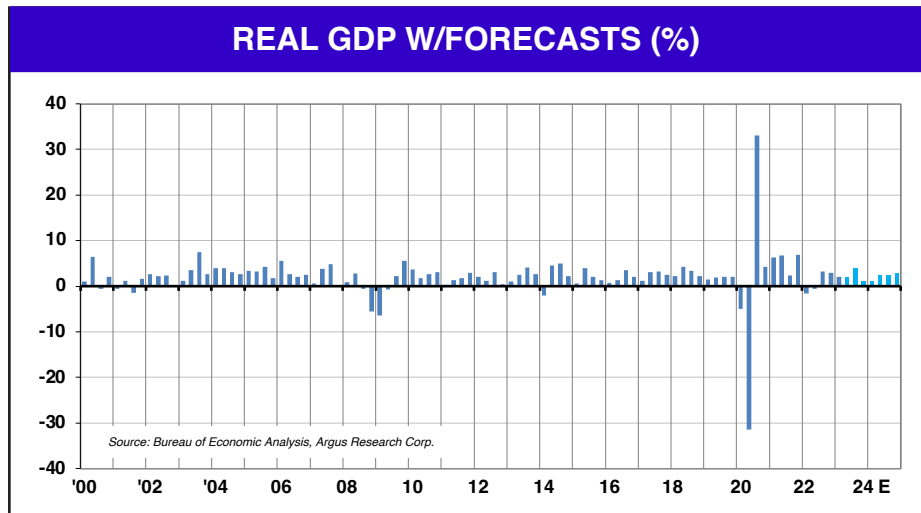
November 1, 2023

- **Artificial Intelligence:
Investment Ideas in the Age of Generative AI**
 - Jim Kelleher, CFA, Director of Research
 - John Eade, Argus President

- **Argus Quick Notes**
 - Investing in the Cloud
 - Revenge Eating
 - Favored Banks for Earnings Season
 - Where to Look for AI Opportunities
 - Find these on the homepage of our website

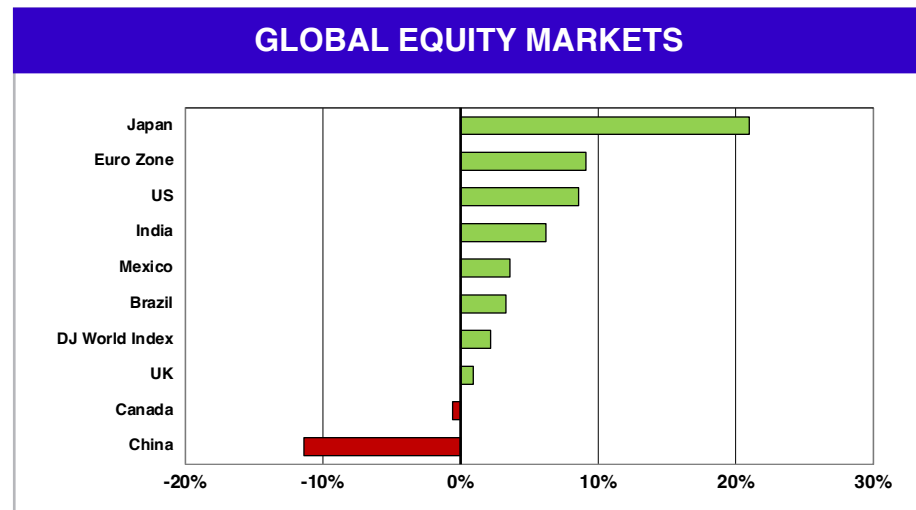
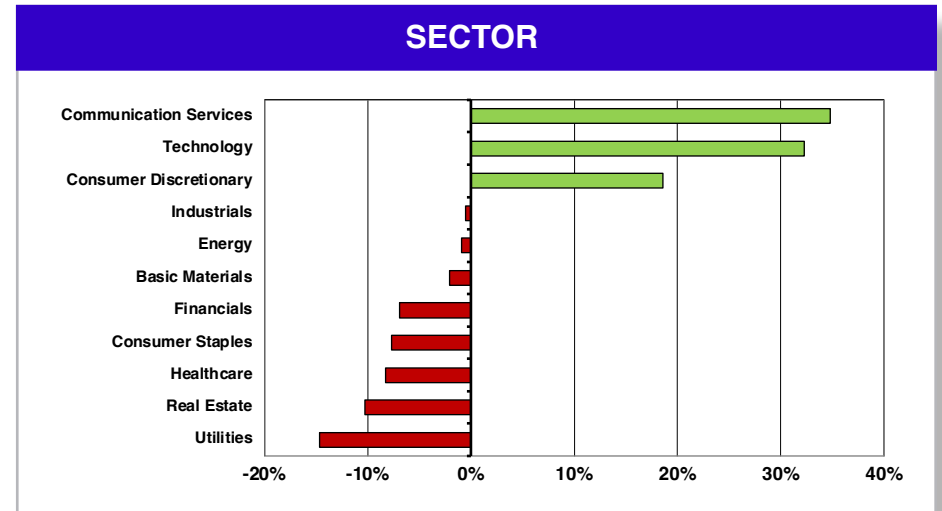
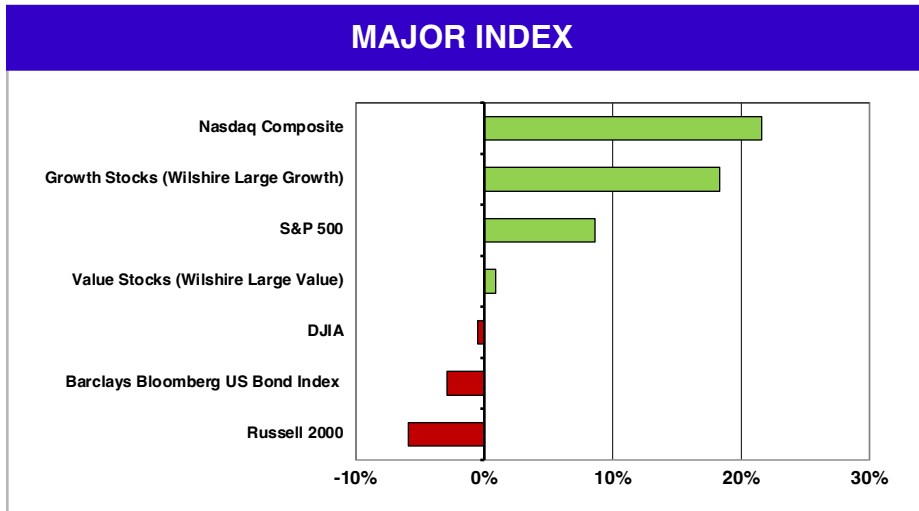
- **Portfolio Update: Argus Innovation Model Portfolio**
 - Innovation hard to find, you know it when you see it
 - US economy has evolved as rough goods manufacturing moved overseas
 - Innovation (vaccines, digital services) drives growth amid this change
 - Find the Argus Innovation MP on the homepage of our website

MACRO FORECASTS



MARKET PERFORMANCE

DATA AS OF OCTOBER 30, 2023



■ AI Overview

- **Increasingly, AI applications are real and practical**
 - » Chatbots, smart thermostats, recommender systems
 - » Bank transactions, physical flow of good through warehouses
- **Launch of ChatGPT spurs land-rush mentality in AI**
- **Developing in-house AIs beyond the reach of most companies**
- **We expect AI to be delivered as-a-service via hybrid cloud**

■ AI Foundational Concepts

- AI is dependent on hyper-fast, massively parallel computing
- Algorithms shorten problem-solving sequences
- GPU computing accelerates CPU processing by off-loading non-core functions
- Neural Nets seek to emulate the architecture of neurons in the brain

■ AI Foundational Tools

- Natural Language Processing allows machines to “understand” human language
- Machine Learning uses algorithms to build models such as LLMs
- Deep Learning builds multiple layers that obtain more information from raw data
- Neural Nets seek to emulate the architecture of neurons in the brain
- Inference supersedes training via machine/deep learning to produce a kind of machine reasoning, in which the neural net yields results

■ AI Hierarchy of Large Language Models

- For an AI to “generate” a response, it must operate within a series of structured connections within a large language model (LLM)
- Long Short-Term Memory: recurrent neural net with feedback and feed-forward skills
- Word2Vec: uses vectors to encode each word’s semantic and syntactic qualities; “strings of numbers” (300 numbers per word)
- Transformers: a step-up from Word2Vec by use of self-attention to mimic human cognition
- BERT and GPT (generative pre-trained transformer) are two of the best known transformer models
- Megabyte from Meta is a further step up from transformers. Megabyte sorts inputs into patches

■ The Cloud Enables AI Delivery

- Enterprises that adapted digitization (cloud, analytics, etc.) slow to adopt AI; only 10% of enterprises using AI as of 2015
- Inhibiting factor: need for massively parallel computing implementations, huge software investment to train LLMs, inability to deliver results
- Now at 50%-plus AI adoption. Key driver has been hybrid cloud, and the cloud's ability to deliver AI as a service.
- AI foundations and delivery models still in early days
- We believe the leading providers of AI through the cloud will be the major cloud infrastructure-as-a-service (IaaS) companies (AWS, MSFT, GOOGL, etc.)

■ AI Companies: Enablers

Nvidia (NVDA) — target price \$600

- **GTC 2023: ChatGPT creates “iPhone moment” for AI**
 - » DGX H100 AI supercomputer with “Grace Hopper” superchip
 - » Four inference platforms to train LLMs
 - » AI foundations to enable enterprises to operate custom AI models
 - » DGX Cloud: AI infrastructure-as-a-service delivered via cloud
- **Nvidia data center: \$40 billion revenue in FY24 (vs. \$15 billion in FY23)**
- **Nvidia leads in all parts of AI economy and is early leader in AlaaS via cloud**

Apple (AAPL) — target price \$230

- **Most GPU processing done in server farms, not on device**
- **Apple bionic A processors perform similar to tensor processing**
- **Neural engine (ASIC on edge device) means images remain private**
- **Apple developing real lead in computing on the edge**
- **Mac, wearables, iPad, iPhone – multiple AI-capable edge devices**

Amazon (AMZN) — target price \$165

- **Investing up to \$4 billion in Anthropic, provider of AI foundational models**
- **Will train future foundational models on AWS Trainium and AWS Inferentia chips**
- **Also provide AWS customers worldwide with access to its foundation models via Amazon Bedrock**
- **As leading provider of IaaS, AWS is uniquely positioned in AI-as-a-service market**

■ AI Companies: Enablers

Microsoft (MSFT) — target price \$390

- Long term strategic partnership with generative AI leader OpenAI (ChatGPT)
- “Copilot” integration across product portfolio and tech stack
- 18,000 organizations using Azure AI
- Monetization – contributed three points of growth to Azure Cloud Service revenue in the September quarter.

Alphabet (GOOGL) — target price \$153

- Foundational research into generative AI but “surprised” by ChatGPT success
- Launched Bard chatbot in March, 2023
- Anthropic and Nvidia partnerships
- Threat to Google Search
- AI applications in Google Cloud, digital advertising, and YouTube

Meta Platforms (META) — target price \$375

- Meta’s open source Llama 2 model available on both Microsoft Azure and Google Cloud
- Looking to catch up - generative AI biggest investment in 2024
- AI Assistant and AI Studio
 - » metaverse applications perhaps?

■ AI Companies: Adopters

Interpublic Group (IPG) — target price \$35

- Piloting AI programs to generate content, provide strategy & insights, automate tasks
- Programs allow IPG to work smarter and more efficiently
- Partnering with leading AI innovators to create unique data sets

Omnicom Group (OMC) — target price \$90

- Developed proprietary offering of ChatGPT called Omni Assist
- Seeking to “turbocharge” agency teams and automate campaign development
- Omni ID includes generative AI models from CSPs

Kroger Co. (KR) — target price \$66

- In 2022, Kroger and Nvidia announced strategic collaboration around freshness
- Identify deteriorating freshness via computer vision & analytics
- Use of dynamic routing to improve farm-to-plate process
- Optimize store efficiency with digital store simulation (NVDA Omniverse)

■ AI Companies: Adopters

Tesla (TSLA) — target price \$316

- Vehicles collect and analyze data from onboard sensors & cameras
- Uses data to make real-time decisions, take appropriate action
- Formerly partnered with Nvidia in autonomous driving
- Has now developed its own autonomous architecture based on in-house proprietary technology and partnerships.

Marriott International (MAR) — target price \$232

- More than just call-center chatbots to help guests book rooms
- Working with IBM to harness vast amounts of data to detect patterns in traveler behavior and sentiment
- Marriott's cloud-based platform and analytics power Bonvoy, the largest loyalty program in the hospitality industry
- AI helps Bonvoy serve up niche experiences to clients

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