COLUMBIA THREADNEEDLE INVESTMENTS

Our insights on artificial intelligence investing

We sat down with three of our technology experts to get their thoughts on the opportunities in artificial intelligence (AI). Panel participants included:

Paul H. Wick,
CIO, Seligman Investments,
Equity Team Lead, Technology

Sanjay Devgan
Portfolio Manager,
Technology

Rahul Narang
Senior Portfolio Manager,
Technology

AI has become top of mind for investors and the market more broadly. What has been the driver of this narrative shift?

Sanjay Devgan: People have been trying to model human intelligence in computer systems for 30-plus years. What's interesting now is the confluence of computing power, connectivity and storage — those are the fundamental building blocks. On the compute side, we went from millions, to tens of millions, to hundreds of millions, to billions of transistors, so compute power has increased exponentially. If we're talking about connectivity, we're now shipping switches that are capable of supporting 25.6 terabits per second (one terabit is a trillion bits per second). Next year, we're going to start shipping 51.2 terabit switches. And then you've had a coincident increase in memory capacity.

This confluence allows you to run the calculations required for AI. If you boil it down, AI literally is just billions and billions of calculations, just simple math matrix multiplication. But you need to do it many times and then you need to bring that back. The calculation isn't complex. It's just the number of nodes needed to process it is massive.

Rahul Narang: Artificial Intelligence has been topical for several years, but the inflection started to happen last year when companies finally had the computing power and the data to harness more performance from deep neural networks. OpenAI released ChatGPT in late November for public use, which received widespread media coverage and investor interest.

Paul Wick: OpenAI's ChatGPT was the opening salvo. And then it turned out literally a week or two later that Microsoft had invested $10 billion to gain a controlling stake in OpenAI, and that raised a lot of eyebrows.

Narang: I should say that while it seems like AI is a new thing, it's not new to us. It's something we've been researching and investing in for many years with the help of the deep bench of central research analysts at Columbia Threadneedle Investments.

How does the advent of AI compare to things like the launch of the internet, cloud-based computing or mobile devices?

Wick: I think the advent of generative AI, and AI in general, is going to rival the advent of the internet and mobile computing as a really important trend in the technology marketplace. One area in which it's going to be a little bit different is that it's not necessarily a distribution engine. So, you think about the internet and mobile devices — you're able to consume games, do commerce online and view advertisements. Those developments were big distribution developments as well as new technology developments. Generative AI, I think, is going to be a very powerful tool for knowledge workers, in particular, and I think it's going to make the internet just easier to use and much more powerful.

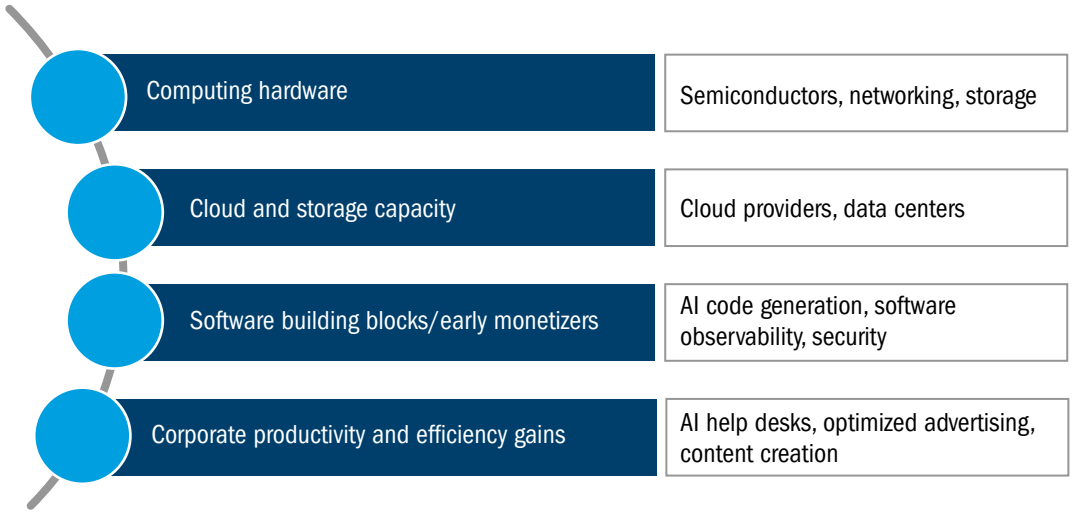
Narang: We are viewing AI as the next platform transition. You know, we had PCs, the internet, mobile era and cloud computing, and now we're seeing AI. Similar to how some of these other technologies had a lasting impact on the global economy, we expect AI to add $7 trillion of global economic impact over a ten-year period.

What are some of the areas of opportunity in AI that you are excited about?

Narang: The speed of innovation from companies around AI is breathtaking. We are seeing a faster cadence of product releases that is helping create better products for end users. For example, Microsoft has released several co-pilots which could help drive productivity gains when writing code. Other areas we are seeing AI being used by companies are for customer service, IT help desks, content creation, fraud detection, supply chain optimization as well as predictive maintenance. The emergence of AI in health care is reshaping how patients are diagnosed, treated and monitored. NVIDIA is doing a fair amount of work here. Specialized large language models should help speed up the discovery of new life saving drugs. We also expect to see more advanced use cases in autonomous driving and robotics over time.

Devgan: There are obviously a lot of great tangible things that you can point to today. But I don't think the really big thing has been developed yet. I think it's going to be somebody, you know, some kid sitting in his college dorm, asking "how do I leverage this?" If we go back to the transition from 3G to LTE and cellular handsets, I remember as a consumer I would just look at the web on my phone thinking, why do we need LTE? But you had businesses like rideshare applications, things like Uber and Lyft that could not exist in the 3G realm and that came to fruition because of that advance.

The opportunity set for AI is expected to expand



How fast do you expect to see these AI-related changes unfold?

Narang: The speed of change is hard to predict, but so far, it is fair to say this has been faster than most investors expected — ChatGPT reached 100 million users quickly, and NVIDIA recently delivered quarterly results, with guidance a few years ahead of schedule. We continue to expect sporadic breakthroughs as the technology evolves.

Do you expect AI to introduce a lot of new players in the tech space, or will we see the big get bigger?

Wick: Well, it just so happens that a lot of the companies that are beneficiaries of AI are also well-positioned with the rest of their businesses. So even if AI wasn't this monumental new trend, companies like Google or Lam Research or Broadcom or NVIDIA would still be doing pretty well. AI is kind of icing on the cake.

Devgan: I'll look at it from a hardware and software perspective. If I look at hardware, given that chip development costs are north of $100 million just to develop one chip, and that's if you get it right the first time, I think you're likely to see the incumbents get bigger. Yes, it's possible there could be a startup, but I'm just you know, I think the deck is kind of stacked against them.

Now, if we go to the services side, I think there will be applications of AI for certain end markets. There are going to be some smart people, some smart kids in their dorms, that can leverage this technology to create a business off of it, and that's where you're going to see the opportunity for new players.

Narang: As the technology continues to evolve, and the infrastructure continues to expand, other sub-sectors within technology will likely benefit. This includes IT services companies that will help with the implementation of AI use cases, as well as software companies via enhanced value proposition, data monetization and productivity improvements. The cloud providers have huge amounts of data and are building strong generative AI environments. The capital expenditure dollars being spent by the cloud titans into building out AI infrastructure is staggering.

Data remains a differentiator, in which mega-cap technology companies can widen their competitive moat and benefit from AI. Some of the other companies that are currently benefiting from this theme are NVIDIA, Microsoft, Meta, Alphabet, Broadcom, Synopsys, Arista Networks and Adobe, just to name a few. This list is not comprehensive by any means. Investors will need to be patient. As with other technological shifts, some winners emerged immediately, but others emerged years later.

How is demand for AI impacting the semiconductor space?

Wick: Well, NVIDIA has the early lead in the technology that trains the data set, but there are other companies, especially the hyperscalers — Meta, Amazon, Microsoft, Google — that are all developing their own custom semiconductors and the companies that are helping them create these new chips are likely going to do very well. That would be the ASIC chip suppliers like Marvell and Broadcom. You also have the plumbing of these data centers; they require massive computation and access to stored information, so you need low latency, and increasingly, these AI data centers are going to switch to ethernet, so ethernet switch makers should be a beneficiary.

Another area where AI has some really interesting implications is semiconductor capital equipment. Chips needed for AI consume a huge amount of a 12-inch wafer, so the die sizes are getting bigger, and they're getting so big that increasingly the designers are having to break them up into multiple chips and then package them together. A company that seems to have the lion's share of getting these chips stacked on top of each other and interconnected properly is Lam Research.

There's another aspect to the plumbing that's quite interesting, though, and that has to do with just the electricity to run the data centers. These data centers are incredibly power hungry, much more so than a conventional data center that just serves videos or music or social media, for example. And one of the big problems that we have in the United States — and actually throughout the world — is that there's a huge shortage of power transformers. There's a concept called time to power, and it's getting increasingly hard to get a new data center hooked up to the electrical grid. An example of a company that is currently capitalizing on this is Bloom Energy. They have natural gas based fuel cells that run on hydrogen. If you're a data center and you want to put in a power hungry AI building with lots and lots of racks of servers and video graphics processors, and the local utility tells you that you that have to wait 18 months before they can hook you up, you can go to Bloom Energy.

What are the risks for investors as they think about investing in AI?

Wick: We try to stay grounded, and we ask ourselves, is this a reasonable valuation to pay? How good could earnings possibly be? You have to look at traditional metrics like the market value relative to the annual sales of the company and whether the company is or will be profitable. Does the management team have a good execution track record? Is the accounting conservative or is it aggressive?

Narang: Many earnings conference calls are littered with AI references and partnerships. We have been investing in this theme for many years but have done so in a disciplined manner. One needs to really dig into the business model: Does the company have a competitive moat around their business, understand product differentiation, look at unit economics, the competitive landscape, the total addressable market (TAM), how sustainable is demand, and then overlay valuation analysis? We are looking for AI-related products taking market share, perhaps translating into margin improvement, or adding incremental revenues. It is important not to get caught up in the hype of AI marketing.

Is there anything that you think is getting lost/overlooked by the market?

Wick: I mentioned time to power, and I think most people aren't paying attention to that angle. I think the market is generally looking pretty hard to uncover companies that have an AI hook and there aren't that many cases where the market has missed it.

Narang: Regulation is a big unknown. We're not exactly sure how that's going to play out and it could slow the pace of adoption or create impediments. I think countries around the world are trying to figure this out. One other thing that could really slow this down is just bad data. This technology relies on data, and if we start to see bad outcomes from bad data, that could give a pause to the way companies are thinking about deploying AI.

columbiathreadneedle.com

CTNP DT7 (08/23) 5845861