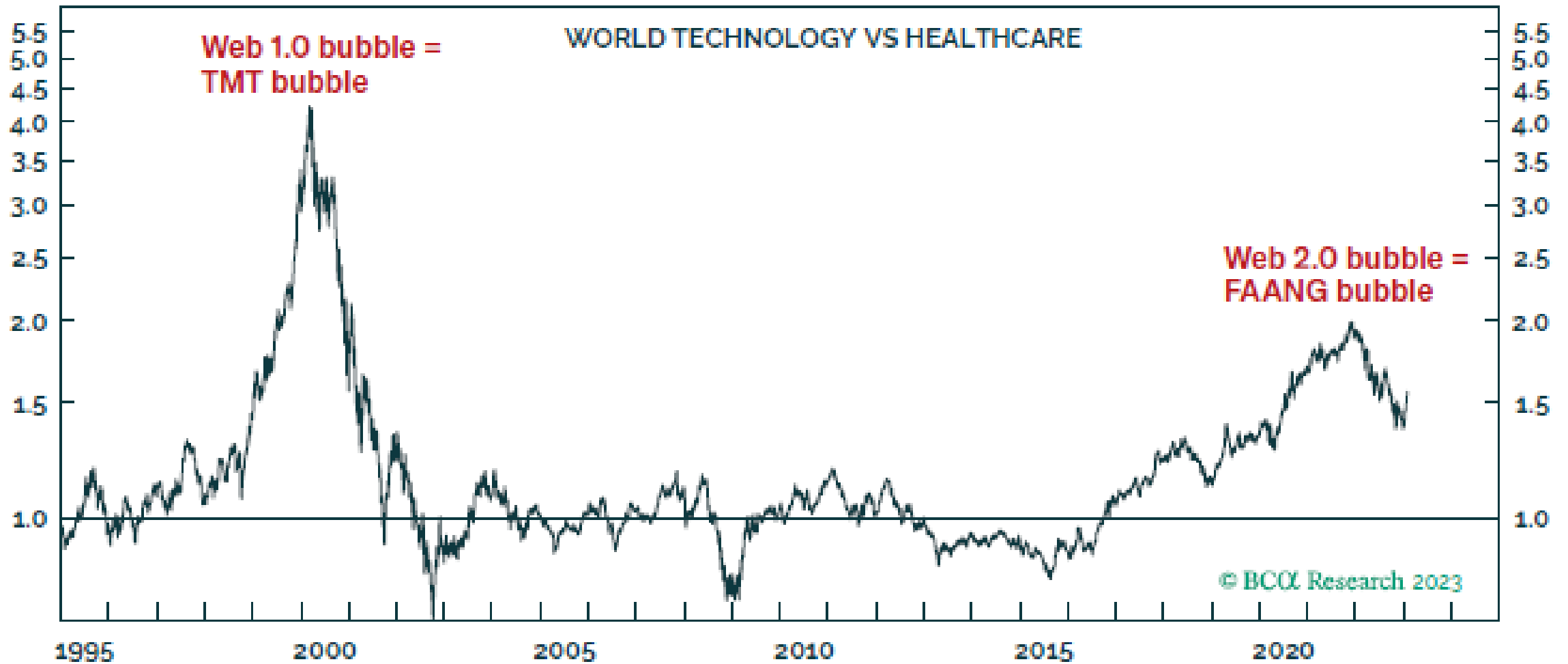


The Web 2.0 Bubble Is Bursting



MSFT
▲ 0.2%

GOOG
▲ 0.1%

META
▲ 0.3%

AAPL
▲ 0.7%

JNJ
▲ 0.1%

LLY
▲ 0.1%

누구의 몫?



Economists Don't Feel the AI Threat, But Salespeople Do

Investors were asked: Will AI take your job in 3 years?

■ No ■ Yes

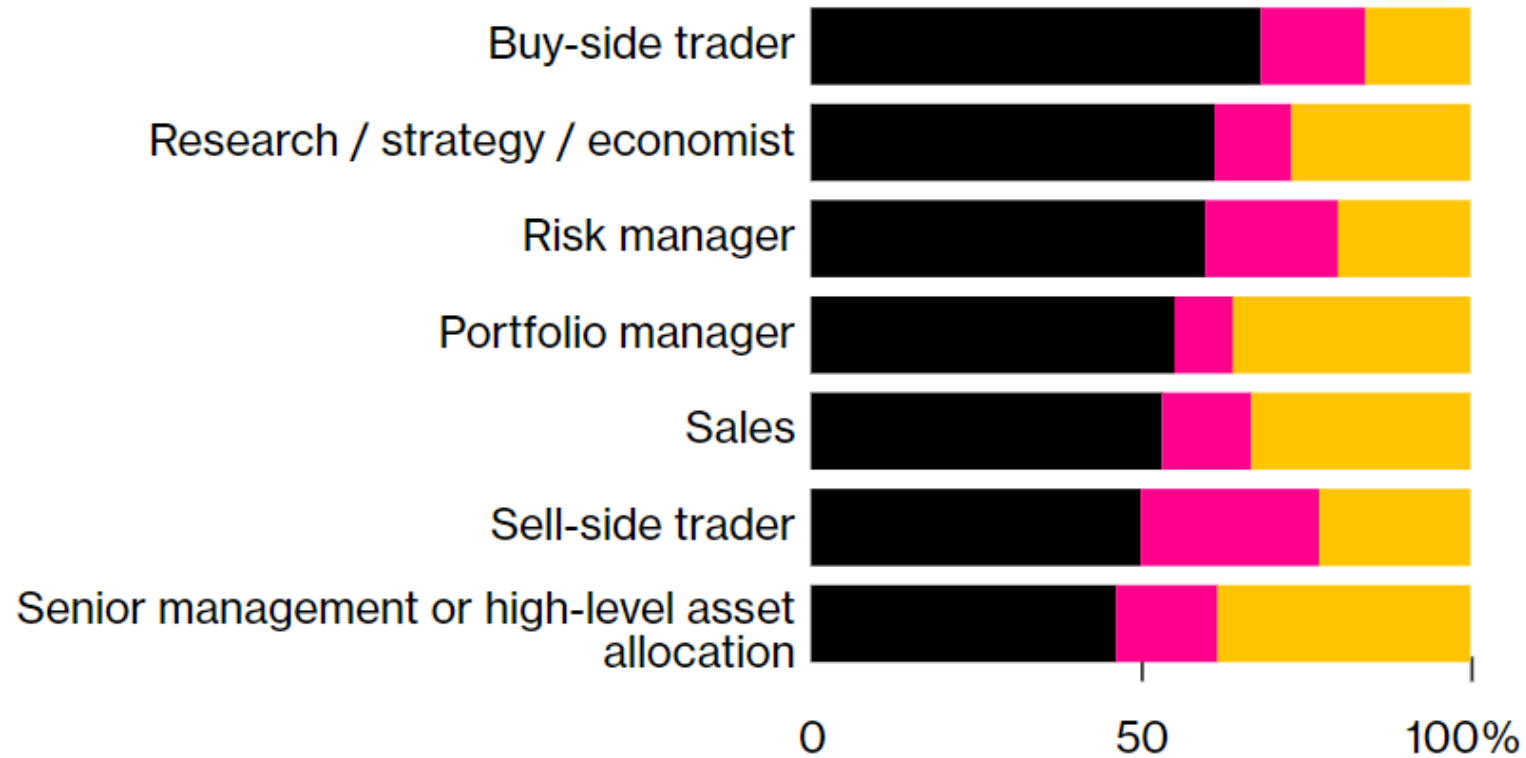


Source: Bloomberg MLIV Pulse survey Jan. 30- Feb. 3.

Staying Away From Bots

Investors were asked about use of AI in their jobs

- Not using AI, not planning to
- Already using AI in investing / trading
- Planning on using AI in investing / trading



Source: Bloomberg MLIV Pulse survey Jan. 30-Feb. 3

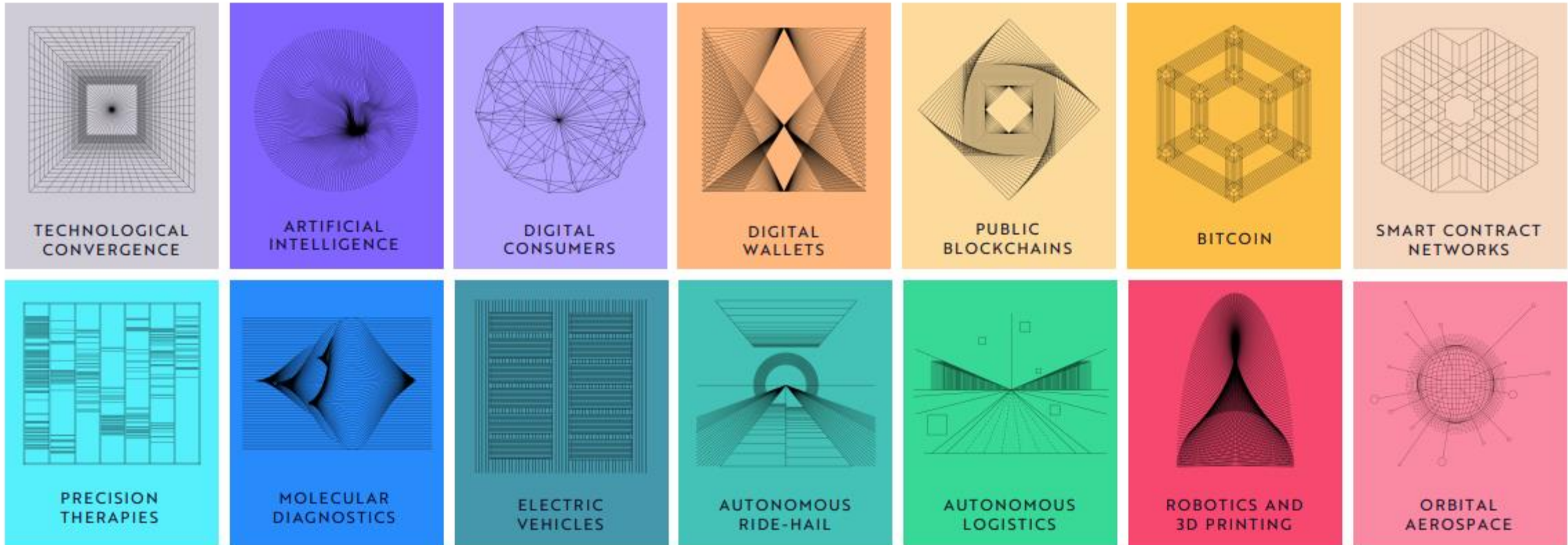
BIG IDEAS 2023



January 31, 2023

ARK Investment Management LLC

www.ark-invest.com



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Big Ideas 2023

Innovation is Taking Off

ARK aims to deliver long-term capital appreciation by investing in the leaders, enablers, and beneficiaries of disruptive innovation. We believe every investor should have a strategic allocation to innovation, not only to access potential exponential growth opportunities typically absent from broad-based indices, but also to hedge against the increasing risk that incumbents will be disrupted.

To enlighten investors on the long-term impact of innovation, we began publishing Big Ideas in 2017. This annual research report seeks to highlight the technological breakthroughs evolving today and creating the potential for super-exponential growth tomorrow.

Artificial Intelligence

Computational systems and software that evolve with data can solve intractable problems, automate knowledge work, and accelerate technology's integration into every economic sector. The adoption of **Neural Networks** should prove more momentous than the introduction of the internet and create 10s of trillion dollars of value. At scale these systems will require unprecedented computational resources, and AI-specific compute hardware should dominate the **Next Gen Cloud** datacenters that train and operate AI models. The potential for end-users is clear: a constellation of AI-driven **Intelligent Devices** that pervade people's lives, changing the way that they spend, work, and play. The adoption of artificial intelligence should transform every sector, impact every business, and catalyze every innovation platform.

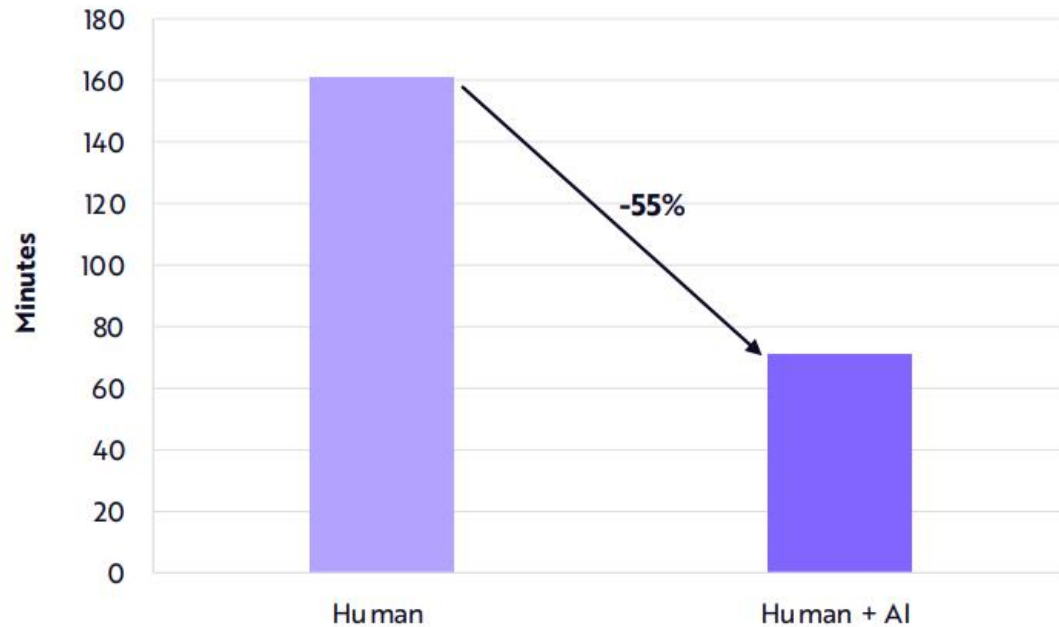


AI Is Increasing The Productivity Of Knowledge Workers

Coding Assistants

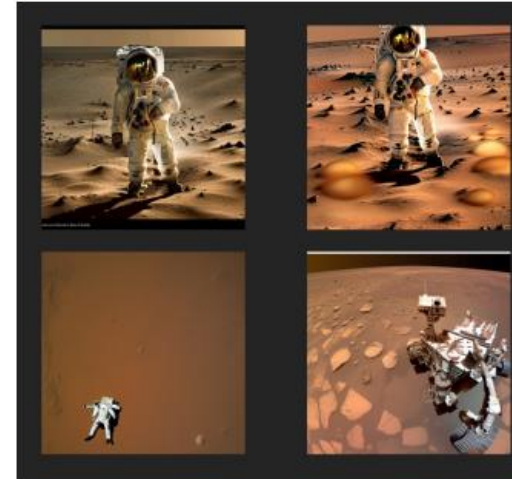
Software engineers completed a coding task in less than half the time with AI coding assistant GitHub Copilot.

Time to Complete Coding Tasks: 2022*



Generative Image Models

According to our research, AI can create a graphic design for just \$0.08** in minutes – a *di minimis* cost compared to \$150 for human labor.



Human

Cost \$150
Time 5 Hours



Generative AI

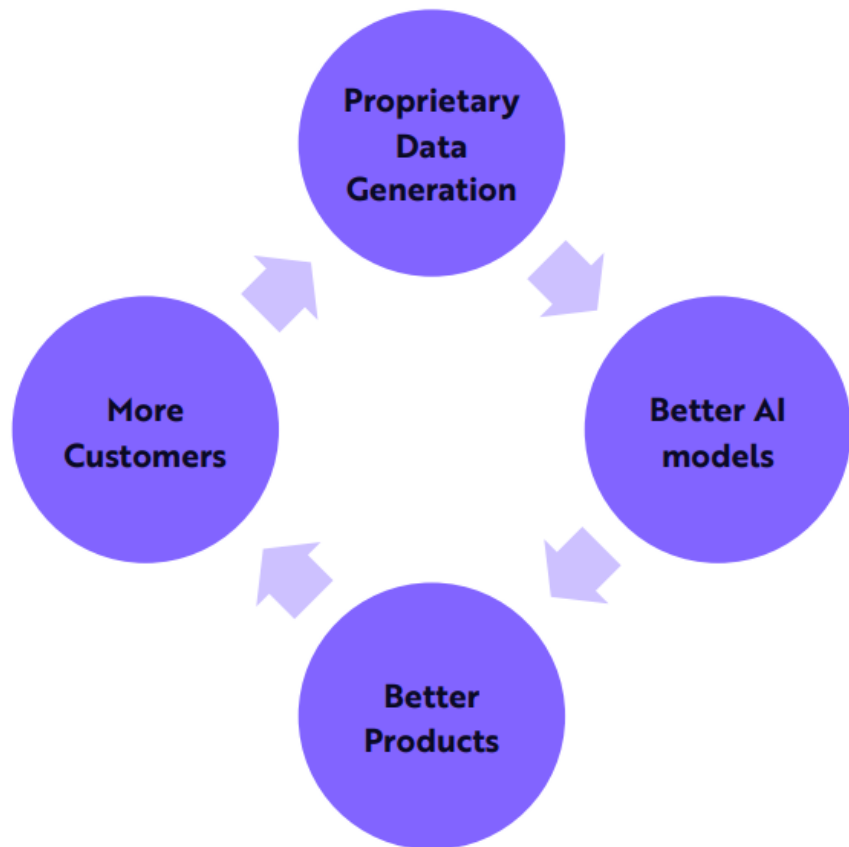
Cost \$0.08
Time < 1 Minute

*Based on data from GitHub. **Generative AI models translated "a picture of an astronaut on Mars" into multiple images in just a few seconds. Sources: ARK Investment Management LLC, 2023. Kalliamvakou, E. 2022. Forecasts are inherently limited and cannot be relied upon. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security. Past performance is not indicative of future results.



Proprietary Data Could Create Moats

High-quality domain-specific AI training data could result in winner-takes-most outcomes across vertical applications.



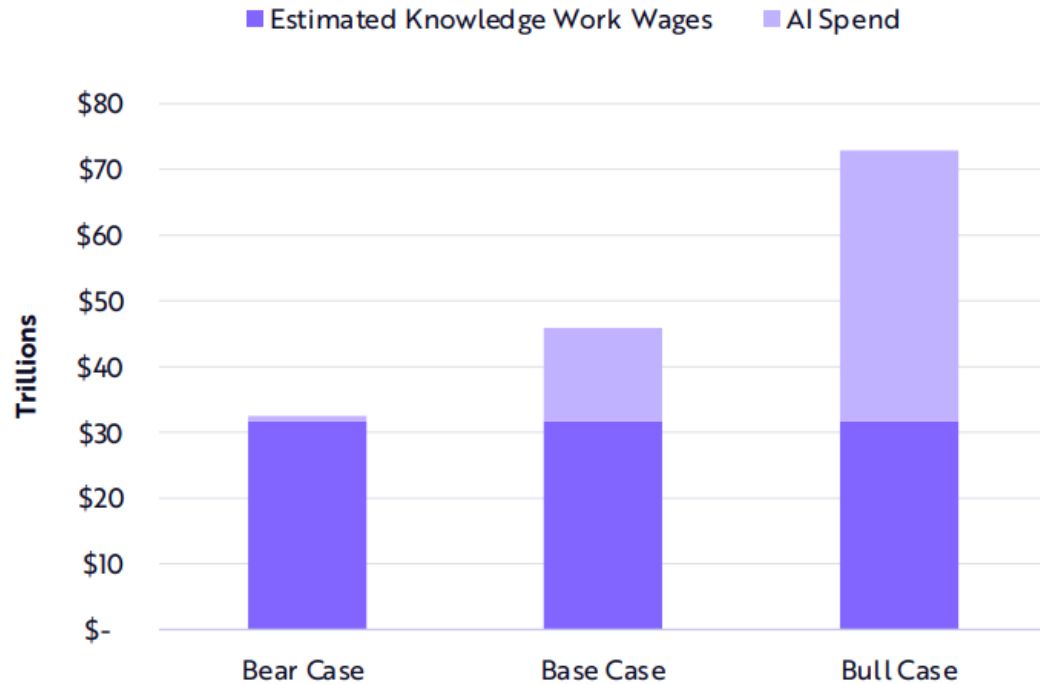
Domain	Autonomous Driving	Software Development	Dialogue
Data Metric	Recorded real-world driving miles	Lines of code	Logged conversations
Feedback Loop	Autonomous disengagements	Rejected code	Rephrased questions
Company Example	Tesla	Replit	Twilio



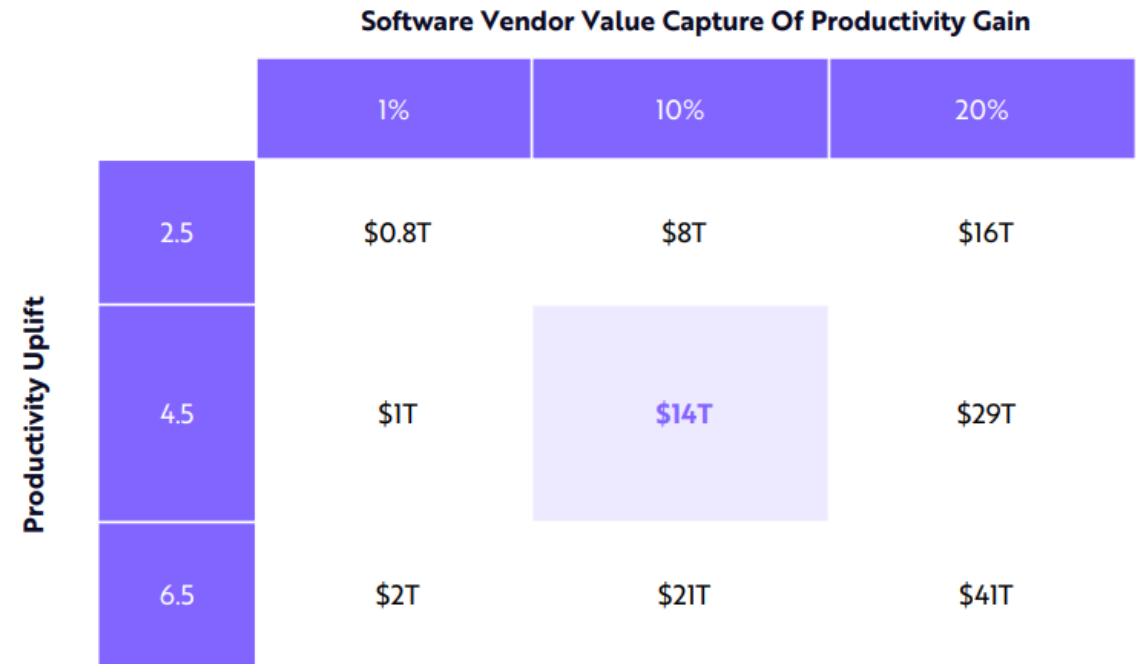
AI Should Increase Knowledge Worker Productivity Dramatically

According to ARK's research, AI should increase the productivity of knowledge workers more than 4-fold by 2030. At 100% adoption, AI spend of ~\$41 trillion could increase labor productivity ~\$200 trillion, dwarfing the ~\$32 trillion in knowledge worker salaries and rivaling current projections of global GDP* in 2030. If vendors were to capture 10% of value created by their products, AI software could generate up to \$14 trillion in revenue and \$90 trillion in enterprise value in 2030.

Estimated Human Knowledge Work Wages Relative To AI Spend In 2030



AI Total Addressable Market (TAM) Forecast In 2030



*Gross Domestic Product. Sources: ARK Investment Management LLC, 2023. Forecasts are inherently limited and cannot be relied upon. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security. Past performance is not indicative of future results.

Contagion Fears Ease

Emerging-Market credit-default premium erases post-Ukraine-war spike



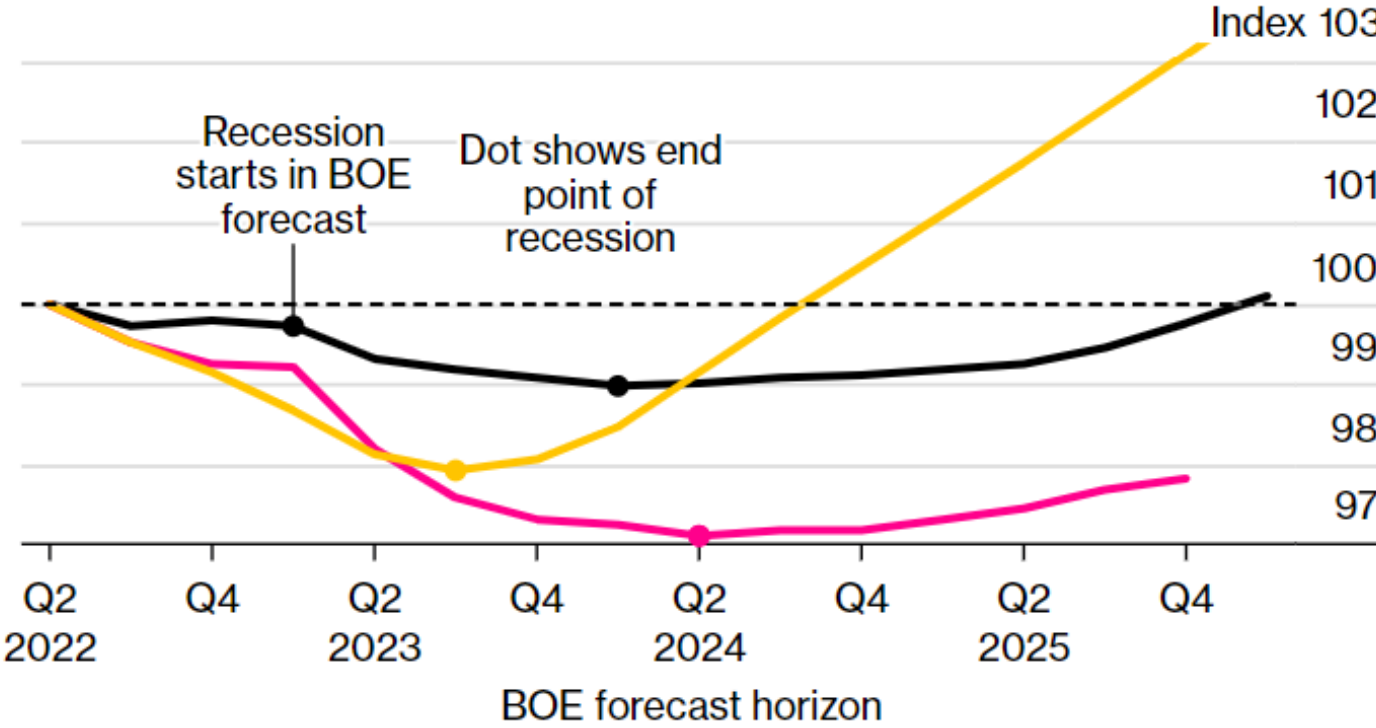
Source: IHS Markit, Bloomberg

Bloomberg

The BOE is Now Forecasting a Shorter, Shallower Recession

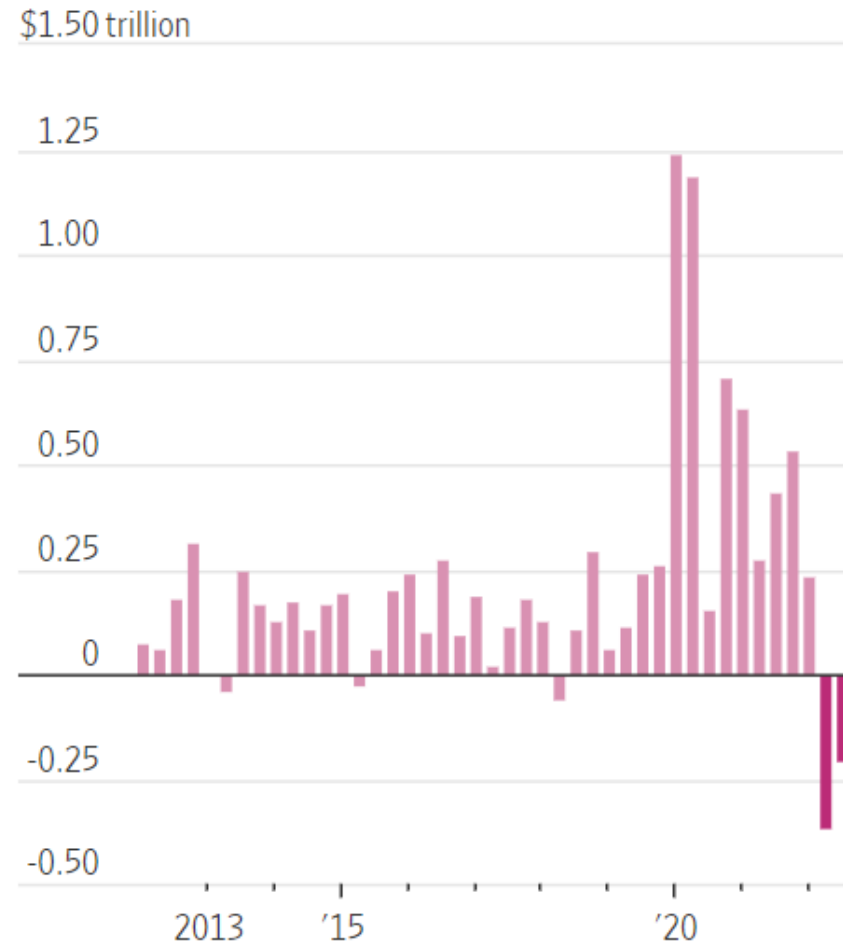
GDP is expected to decline just 0.8% over five quarters

BOE February forecast BOE previous OBR forecast



Source: Bloomberg analysis of Bank of England, Office for Budget Responsibility forecasts. OBR and previous BOE forecasts made in November

Quarterly change in deposits at U.S. banks



Source: Federal Deposit Insurance Corp.

Bonus Bonanza

Japan's cash earnings grow at fastest clip since 1997 as extra payments soar



1997-1999

2000-2004

2005-2009

2010-2014

2015-2019

2020-2024

Source: Labor ministry

Bloomberg

Further Inversion

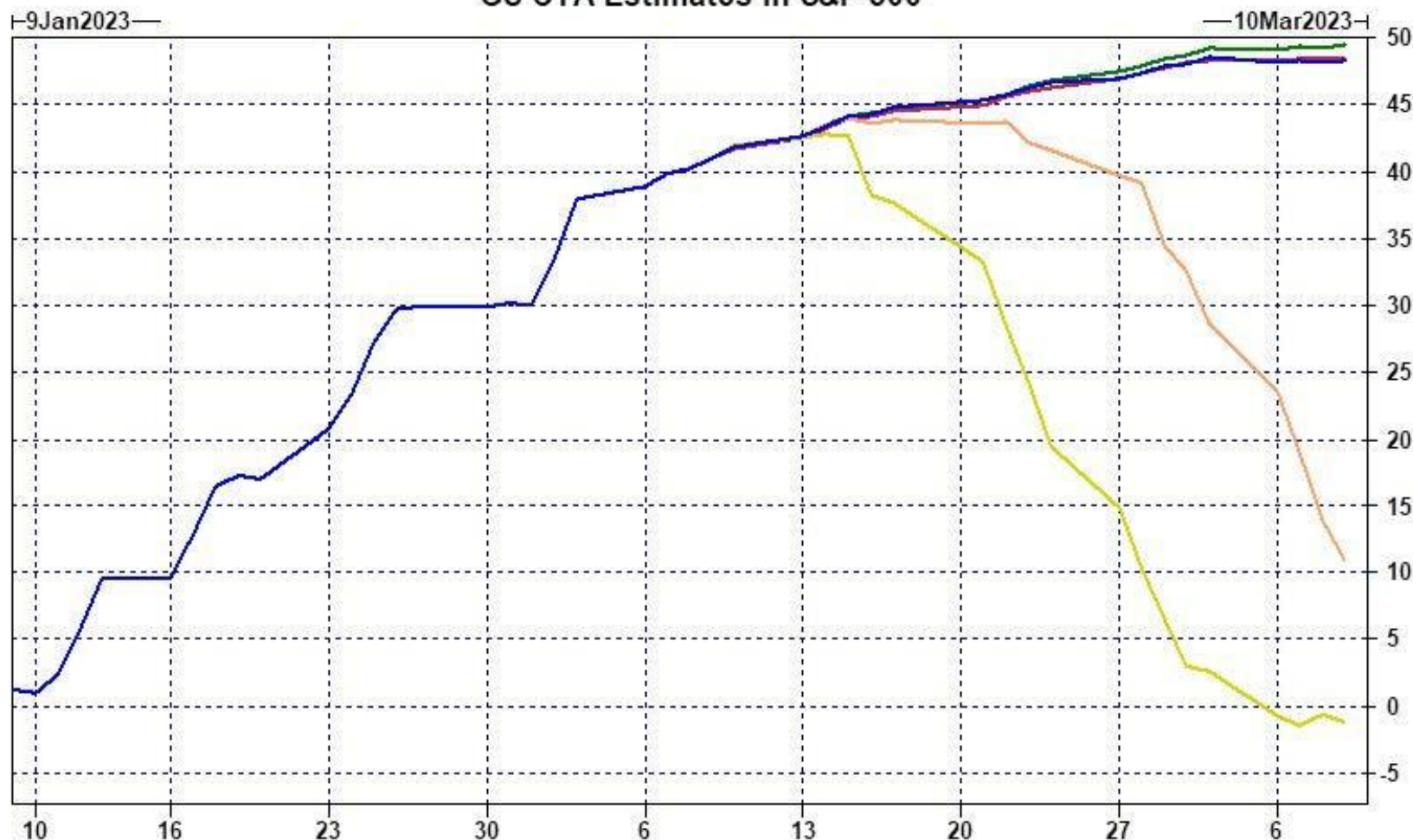
US 2-year yield exceeded 10-year by 86 basis points



Source: Bloomberg

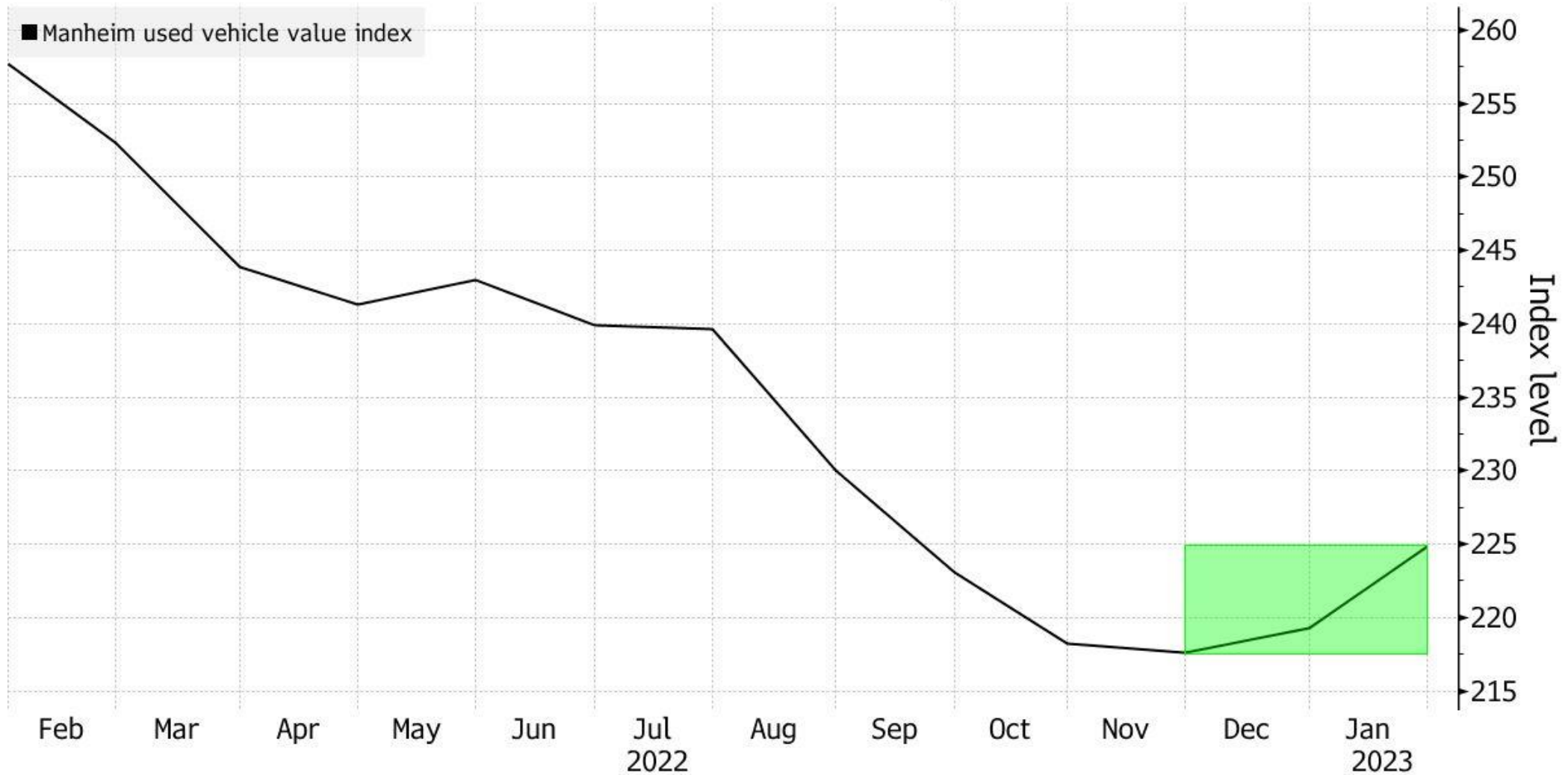
Bloomberg

GS CTA Estimates in S&P 500



	High	Low	Avg.	Last	StdDev
—Realized & Mkt Flat Baseline	48.4799	1.0925	33.0758	48.2557	15.1385
—Mkt +1 Std Dev	49.4962	1.0925	33.2546	49.4962	15.3177
—+2 Std Dev	48.4359	1.0925	33.0357	48.3317	15.1099
—Down 1 Std Dev	44.0195	1.0925	28.3283	10.9402	13.4927
—Down >2 Std Dev	42.7578	-1.3387	21.6409	-1.1633	14.9635

Used Cars Get Pricier After 2022 Drop



Source: Manheim

Bloomberg 

MEETING PROBABILITIES

MEETING DATE	400-425	425-450	450-475	475-500	500-525	525-550	550-575	575-600
2023-03-22	0.0%	0.0%	0.0%	90.8%	9.2%	0.0%	0.0%	0.0%
2023-05-03	0.0%	0.0%	0.0%	24.4%	68.8%	6.8%	0.0%	0.0%
2023-06-14	0.0%	0.0%	0.0%	13.7%	49.3%	34.0%	3.0%	0.0%
2023-07-26	0.0%	0.0%	0.0%	13.0%	47.5%	34.8%	4.5%	0.1%
2023-09-20	0.0%	0.0%	2.3%	19.2%	45.3%	29.3%	3.7%	0.1%
2023-11-01	0.0%	0.7%	7.5%	27.3%	40.3%	21.4%	2.6%	0.1%
2023-12-13	0.5%	5.3%	20.8%	36.0%	27.6%	8.8%	0.9%	0.0%