

2024 EBRI–Milken Institute

Retirement Symposium

Planning for Innovation & Impact



Welcome and Introductions



Barb Marder
President and CEO, EBRI



Michael Piwowar
Executive Vice President, MI
Finance, Milken Institute

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Generative AI and Large Language Models: Opportunities, Risks, and its Use in Finance



Sri Krishnamurthy
CEO, QuantUniversity



QuantUniversity, LLC

www.quantuniversity.com

ChatGPT, Generative AI and Large Language Models: Opportunities and Risks in Finance

Presented By:

Sri Krishnamurthy, CFA,

CAP

sri@quantuniversity.com

01/23/2024

EBRI-Milken Institute 2024 Retirement Symposium

Washington D.C.

My life with ChatGPT in three examples!



Personalization

- Prepare a letter for a potential high net-worth investor who is interested in leveraging your investment advisory services.
- The investor is planning to retire in 10 years and has two kids ready to go to college in 2 and 3 years.
- He has a chronic health condition that requires significant medical expenditure on short notice and he needs to plan enough liquidity in his portfolio.
- List out the data points you would want your client to bring to the meeting.
- Start the letter by summarizing how the market did in 2023 (research the web for this information)



You

Prepare a letter for a potential high net-worth investor who is interested in leveraging your investment advisory services. The investor is planning to retire in 10 years and has two kids ready to go to college in 2 and 3 years. He has a chronic health condition that requires significant medical expenditure on short notice and he needs to plan enough liquidity in his portfolio. List out the data points you would want your client to bring to the meeting. Start the letter by summarizing how the market did in 2023 (research the web for this information)

ChatGPT

I did a quick search for more information and here's what I found.

Dear [Investor's Name],

I trust this letter finds you well. As we look forward to discussing how our investment advisory services can be tailored to your unique financial goals and needs, I would like to provide a brief overview of the market dynamics we witnessed in 2023.

The past year has demonstrated resilience in financial markets, with the S&P 500 exhibiting a positive trend overall. Despite various challenges and geopolitical tensions, the markets have shown an upward trajectory with intermittent fluctuations. For instance, the S&P 500 index saw a rise from the beginning of the year, with periodic adjustments due to economic, political, and technological events. The index experienced notable growth, particularly in the second half of the year, closing at a higher level in December compared to January. Correspondingly, the 10-year U.S. Treasury Yield also saw varied movements, reflecting the changing economic landscape.



Investment Advisory Services: Engagement Letter

Dear [Investor's Name],

I trust this letter finds you well. As we look forward to discussing how our investment advisory services can be tailored to your unique financial goals and needs, I would like to provide a brief overview of the market dynamics we witnessed in 2023.

The past year has shown a positive trend in the S&P 500, despite various challenges. The index rose from the beginning of the year, with significant growth towards the end, and the 10-year U.S. Treasury Yield reflected the changing economic landscape with its varied movements.

For our upcoming meeting, it would be beneficial for you to bring the following data points:

- 1. A detailed overview of your current investment portfolio.
- 2. Statements of your investment accounts for at least the last three years.
- 3. An estimation of future college expenses for your children.
- 4. Records of your medical expenditures and any forecasts of future healthcare costs.
- 5. Your latest tax returns to understand your current financial standing better.
- 6. Any documentation pertaining to your retirement accounts and pensions.
- 7. Your estate planning documents, if available.

This information will enable us to construct a comprehensive and dynamic investment strategy that considers your upcoming retirement, your children's education, and the liquidity necessary for unforeseen medical expenses.

I look forward to our meeting and am committed to helping you navigate these important financial decisions.

Warm regards,

[Your Name]
[Your Title]
[Your Contact Information]

Document Summarization

- Review the agenda of the EBRI-MILKEN symposium (<https://www.ebri.org/retirementsymposium#agenda>) and prepare a letter of invitation summarizing the key themes and 3 three reasons why someone in the industry should attend it.
- Export this letter into WORD format



Invitation to the EBRI-Milken Institute 2024 Retirement Symposium

Dear [Recipient Name],

I am delighted to invite you to the EBRI-Milken Institute 2024 Retirement Symposium, a premier event that brings together thought leaders and experts in the field of retirement and financial planning.

The symposium will cover several key themes, including the impact of Generative AI and Large Language Models in finance, the latest innovations in FinTech for retirement planning, and insights on employee financial wellness from renowned plan sponsors. Additionally, the event features a C-suite view on these topics, along with important policy updates from Capitol Hill staff and discussions on U.S. Social Security policy.

Attending this symposium will offer you unparalleled benefits:

- 1. Networking Opportunities:** Engage with industry leaders and peers to build valuable connections.
- 2. Insightful Knowledge:** Gain insights from top experts and stay ahead of the latest trends and research.
- 3. Practical Solutions:** Discover innovative strategies to enhance your professional practice in retirement planning.

Your participation will be a valuable addition to the symposium, offering a unique perspective and contributing to the depth of the discussions. For further details about the event, please visit the symposium's website.

We sincerely hope you will be able to join us for this enriching experience and look forward to your positive response.

Warm regards,

Your Name

Your Position

Your Contact Information

ChatGPT 4



You

Review the agenda of the EBRI-MILKEN CONFERENCE (<https://www.ebri.org/retirementsymposium#agenda>) and prepare a letter of invitation summarizing the key themes and 3 three reasons why someone in the industry should attend it. Export this letter into WORD format



ChatGPT

The EBRI-Milken Institute 2024 Retirement Symposium features an extensive agenda focused on several key themes:

1. The impact of Generative AI and Large Language Models on finance.
2. Innovations in FinTech and their role in enhancing financial security and retirement planning.
3. Discussions on employee financial wellness from the perspective of plan sponsors.
4. Insights from the C-suite on retirement and financial planning.
5. Presentations on recent research by EBRI and the Milken Institute.
6. Policy updates from Capitol Hill staff and discussions on U.S. Social Security policy issues.
7. The importance of financial fluency and equity in saving for all.

For more detailed information, you can visit the event's agenda page [here](#).

I'll now prepare a letter of invitation summarizing these themes and providing three reasons why someone in the industry should attend. After drafting the letter, I will export it into a WORD format.



Being dad!

- Helping a 6th grader prepare for a quiz – in a car!



You

Can you provide an introduction to electromagnetic radiation for a Massachusetts 6th grade student who has a quiz on the topic tomorrow?

< 2 / 2 >



ChatGPT

Of course! For a sixth-grade student in Massachusetts, let's break down electromagnetic radiation in a way that's perfect for your quiz.

Electromagnetic radiation is a form of energy that travels through space as waves. These waves have both electric and magnetic properties, hence the name. Think of it like the ocean waves, but these waves can move through space without needing air or water.

There are different types of electromagnetic waves, and they form what's called the electromagnetic spectrum. The spectrum includes radio waves (used in radios and TVs), microwaves (like in microwave ovens), infrared light (which we feel as heat), visible light (the colors we can see), ultraviolet light (which can cause sunburns), X-rays (used in hospitals to see inside your body), and gamma rays (which are very high energy and can be dangerous).

The waves in the electromagnetic spectrum are different in two main ways: their wavelength (how long the waves are) and their frequency (how many waves pass a point in a certain amount of time). Radio waves have long wavelengths and low frequencies, while gamma rays have very short wavelengths and high frequencies.

The only part of the spectrum we can see with our eyes is visible light. It includes all the colors of the rainbow. Red light has the longest wavelength, and violet light has the shortest.

Remember, electromagnetic radiation is all around us and is used in many everyday technologies. It's important to know about it because it helps us understand how things like radios, cell phones, and medical equipment work.

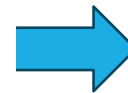
Do you have any specific topics or questions you're concerned about for your quiz?



ChatGPT

Sure, I can create a quiz on electromagnetic radiation for you. Here we go:

1. What is electromagnetic radiation?
 - a) A type of sound wave
 - b) Energy that travels in waves with electric and magnetic properties
 - c) Only visible light
2. Which of these is NOT a type of electromagnetic wave?
 - a) X-ray
 - b) Sound wave
 - c) Infrared light
3. What do we call the range of all types of electromagnetic waves?
 - a) The electromagnetic spectrum
 - b) The energy rainbow
 - c) The wave collection
4. Which electromagnetic waves are used for cooking in microwave ovens?
 - a) Radio waves
 - b) Microwaves
 - c) Ultraviolet waves
5. What type of electromagnetic radiation is used in hospitals to see inside the body?
 - a) Gamma rays
 - b) X-rays
 - c) Infrared light
6. What is the difference between wavelengths and frequencies of electromagnetic waves?
 - a) Wavelength is the color of the wave, frequency is the speed
 - b) Wavelength is the distance between waves, frequency is how many waves pass a point in a certain time
 - c) Wavelength and frequency are the same thing
7. Which type of electromagnetic wave has the longest wavelength?
 - a) Gamma rays
 - b) Radio waves
 - c) Ultraviolet light
8. Which part of the electromagnetic spectrum can humans see with their eyes?
 - a) Infrared light
 - b) Visible light
 - c) Radio waves



The upcoming AI and LLM revolution



Market impact at the speed of light!

Elon Musk @elonmusk Follow

Am considering taking Tesla private at \$420. Funding secured.

9:48 AM - 7 Aug 2018

15,554 Retweets 83,999 Likes

6.0K 16K 84K

Elon Musk @elonmusk · Aug 7

Shareholders could either to sell at 420 or hold shares & go private

1.3K 2.1K 18K

Catherine Kang • 2nd
Event-Driven Feeds | Bloomberg for Enterprise
2d • Edited

Elon Musk announced on Twitter today that he is considering taking Tesla private at \$420/share.

Original tweet on Bloomberg Event-Driven Feeds:
Elon Musk: Am considering taking Tesla private at \$420. Funding secured.
08/07/2018
12:48:13.776 ET

Bloomberg newsroom headline:
*MUSK: AM CONSIDERING TAKING TESLA PRIVATE AT \$420
08/07/2018
12:48:40.650 ET

Please message me to learn more about how our Bloomberg newsroom verified and curated Twitter feed can benefit your trading.

Market impact:

2018-08-07 TSLA US Equity

The chart displays the price and cumulative volume of TSLA US Equity on August 7, 2018. The left y-axis represents PRICE (ranging from 358 to 368), and the right y-axis represents Cumulative Volume (ranging from 0e+00 to 1e+06). The x-axis represents time. Two vertical lines mark the 'Original Tweet' at 12:48:13.776 ET and the 'Bloomberg Headline' at 12:48:40.650 ET. The price shows a sharp upward spike following the tweet, peaking around 368, and then a subsequent decline and recovery.

Interest in Machine Learning and AI Continues to Grow

Figure 3.1. AI patent families and scientific publications by earliest publication year
AI patent families grew by an average of 28 percent and scientific publications by 5.6 percent annually between 2012 and 2017

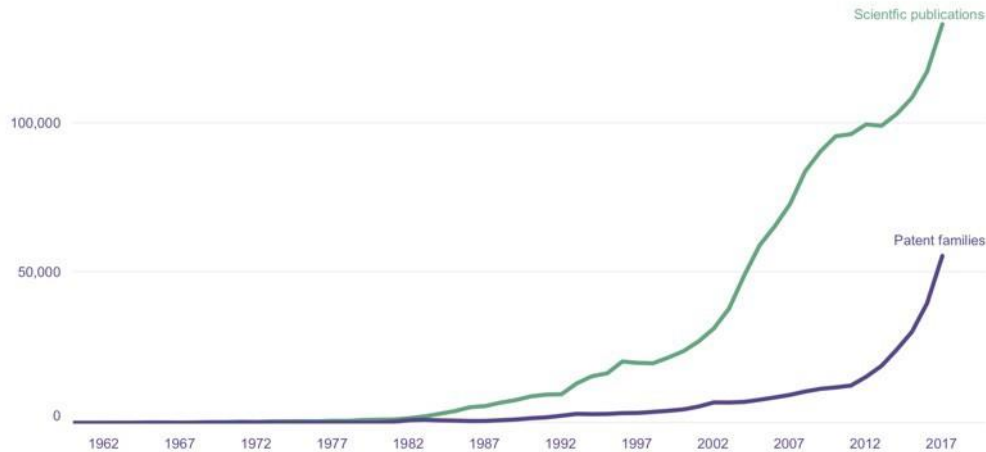
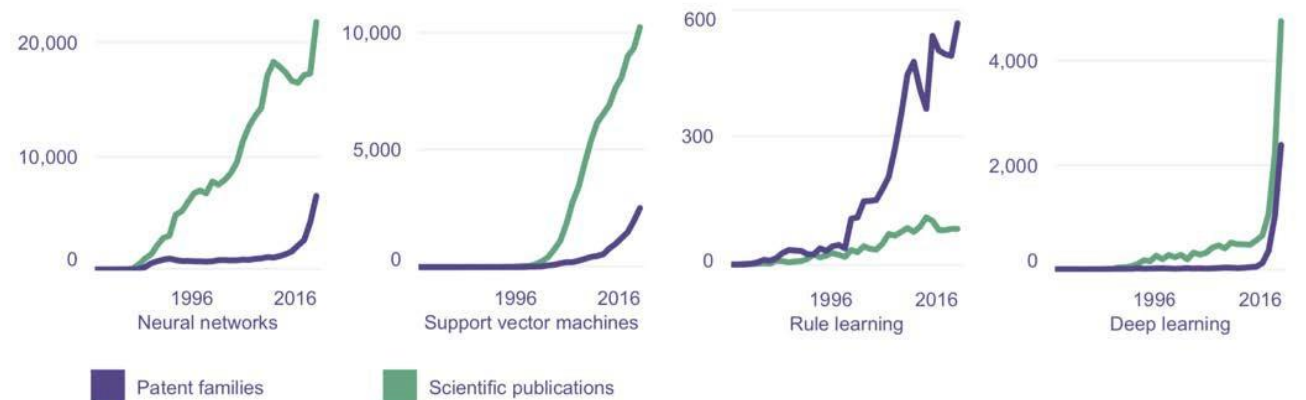


Figure 3.9. Machine learning patent families and scientific publications, by earliest priority year and publication year, respectively

Growth in patent families usually follows scientific publications, except for rule learning which saw a burst of patent filing in 1999



https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf



INVESTMENT BANKING

Goldman Sachs hunts AI experts for all-important quant team

US bank is building its vast strats department by hiring a new generation of machine learning and artificial intelligence specialists



JPMorgan's latest hire proves the bank is serious about artificial intelligence

by Julia Horowitz @juliakhorowitz

May 3, 2018: 7:46 PM ET



Social Surge - What's Trending

Ivanka Trump and Jared Kushner detail vast wealth: Real estate, fashion and investments

AT&T-Time Warner ruling: The media industry hangs in the balance

CNN anchors reflect on the life of Anthony

Artificial intelligence and robotics + Add to myFT

BlackRock bulks up research into artificial intelligence

World's biggest investment group to create AI lab in Palo Alto

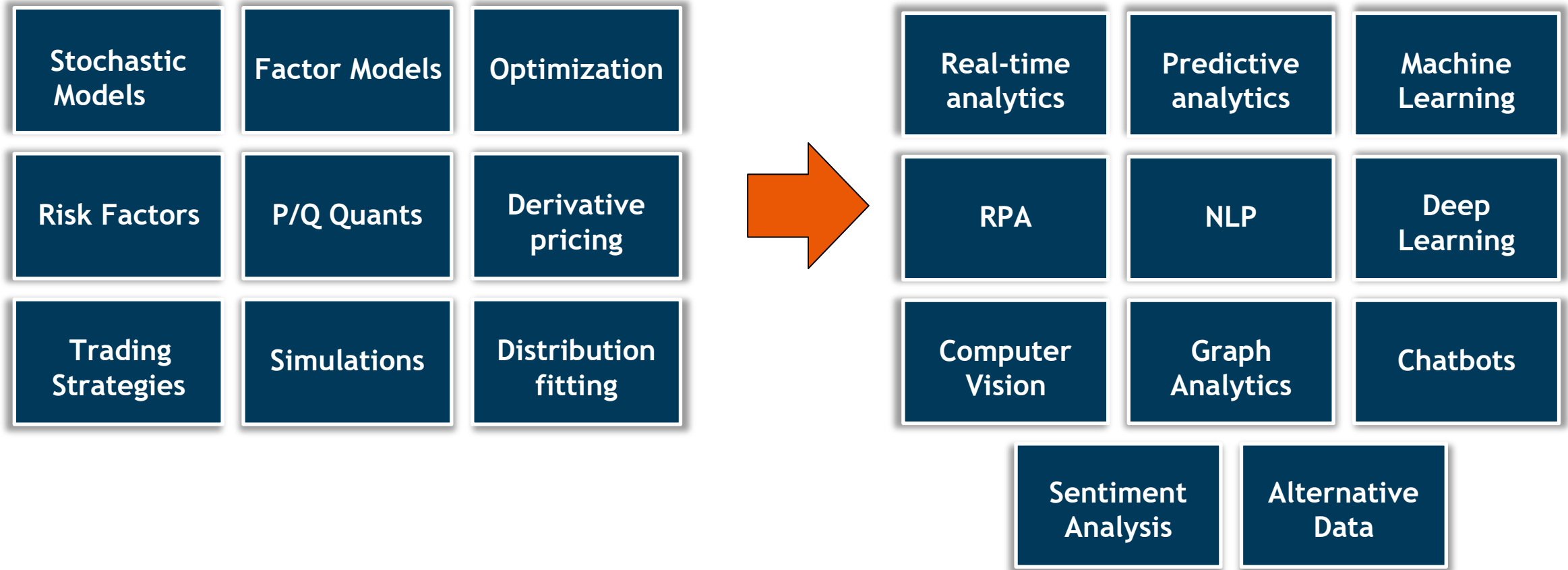
Robin Wigglesworth in New York and Chris Flood in London FEBRUARY 19, 2018

12

[BlackRock](#) is setting up a new centre dedicated to research in ...



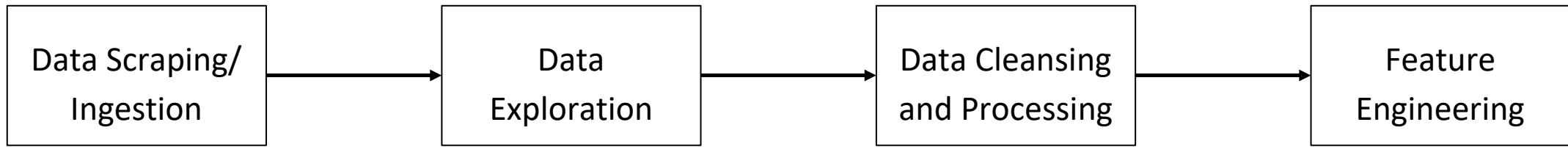
Machine Learning & AI in Finance: A Paradigm Shift



The Machine Learning and AI

Workflow

Data Engineer, Dev Ops Engineer



Robotic Process Automation (RPA) (Microservices, Pipelines)

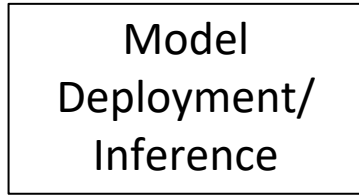


Risk Management/ Compliance(All stages)

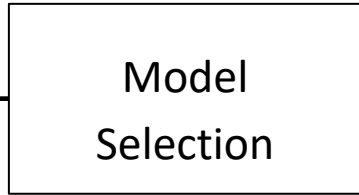
- RMS
- MAPS
- MAE
- Confusion Matrix
- Precision/Recall
- ROC

- Regression
- KNN
- Decision Trees
- Naive Bayes
- Neural Networks
- Ensembles

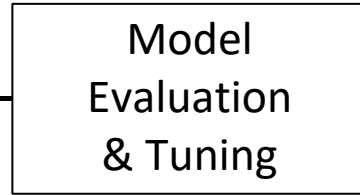
Analysts & Decision Makers



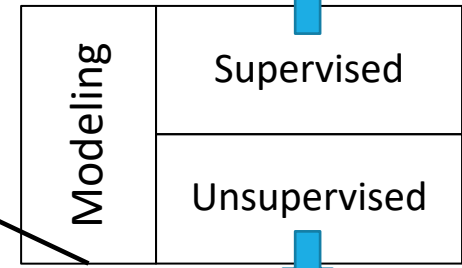
- SW: Web/ Rest API
- HW: GPU, Cloud
- Monitoring



- Auto ML
- Model Validation
- Interpretability



- Hyper-parameter tuning
- Parameter Grids



- Clustering
- PCA
- Autoencoder

Software / Web Engineer

Data Scientist/Quants



Enter ChatGPT

Introducing ChatGPT

We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests.

[Try ChatGPT ↗](#)

[Read about ChatGPT Plus](#)

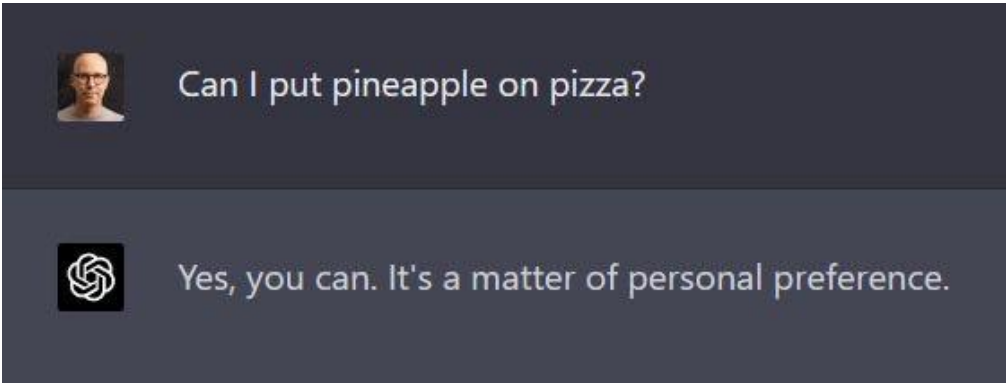


Ref:

Ref: <https://openai.com/blog/chatgpt>



The ChatGPT craze!



TechMoran
History of People's...



GameStar
Was ist ChatGPT? So...



電腦王阿達
OpenAI 推出超神ChatGPT ...



Kulturgutspiel.de
ChatGPT: Künstliche...



GAMINGDEPUTY
Vertrauen Sie ChatGPT nic...



Olhar Digital
O que é ChatGPT e como...



ITK 東洋経済オンライン
宿題を解くAI"が現実に登場...



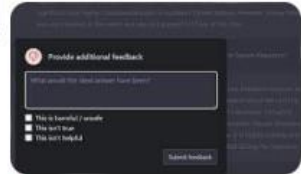
Posizionamento Siti Web
ChatGPT: cos'è,...



Stakque Digital
Top 10 ChatGPT Use Case...



CNEWS
ChatGPT : on a interviewé...



The Miami Hurricane
Is Chat GPT as smart as a...



TabNews
CHAT GPT: COMO...

The prompt

craze!

PromptBase Search Prompts

Marketplace Generate Hire Login Sell

AI Models Art & Illustrations Logos & Icons Graphics & Design Productivity & Writing Marketing & Business Photography Games & 3D

Midjourney, ChatGPT, DALL-E, Stable Diffusion & more Prompt Marketplace

Search 100,000+ top AI prompts. Produce better outputs, save on time & API costs, sell your own prompts.

[Find a prompt](#) [Sell a prompt](#)

Midjourney
Moonlight Popart Illustrations

Midjourney
Chic Illustration Portraits

Midjourney
Holiday Coloring Book Pages For C...

GPT
SEO Blog Articles Following Google...

Featured in

TC TechCrunch THE VERGE WIRED FAST COMPANY
FINANCIAL TIMES Atlantic yahoo/finance WSJ

Featured Prompts





Andrej Karpathy 

@karpathy



The hottest new programming language is English

3:14 PM · Jan 24, 2023 · **3.6M** Views



OpenAI is not the only company!



ARTIFICIAL INTELLIGENCE

Salesforce Announces Einstein GPT, the World's First Generative AI for CRM



Regulators catching up



Ref: <https://www.reuters.com/technology/space/us-space-force-pauses-use-ai-tools-like-chatgpt-over-data-security-risks-2023-10-11/>



Ref: <https://www.reuters.com/technology/germany-principle-could-block-chat-gpt-if-needed-data-protection-chief-2023-04-03/>



Regulators catching up

<https://www.washingtonpost.com/technology/2023/05/04/white-house-ai-ceos-meeting/>

TECH POLICY

White House signals support for AI legislation

The CEOs of Google, Microsoft, OpenAI and Anthropic visit with Biden administration officials wrestling with artificial intelligence technology

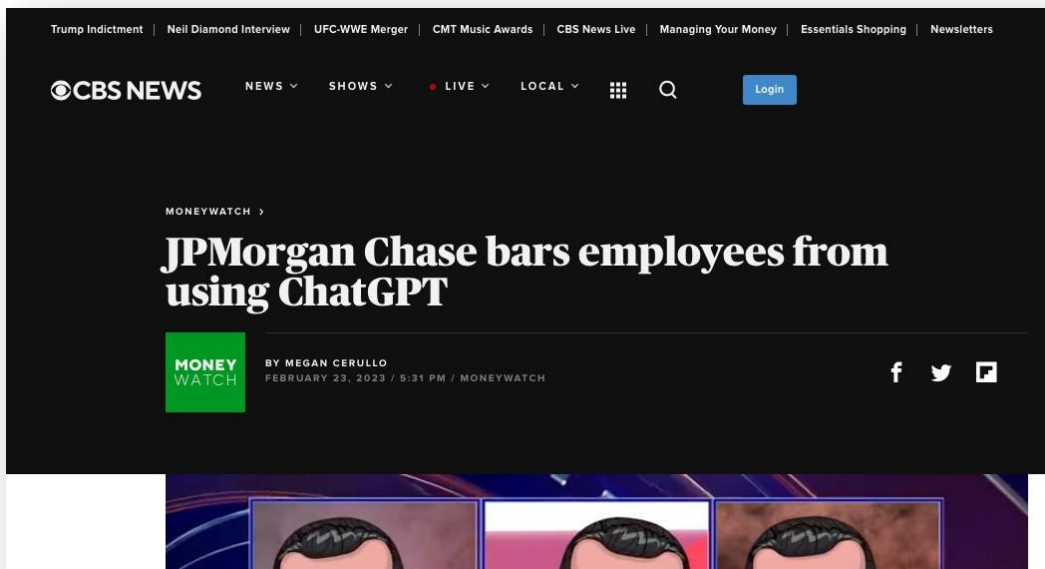


By [Cat Zakrzewski](#)

Updated May 4, 2023 at 6:43 p.m. EDT | Published May 4, 2023 at 5:00 a.m. EDT



Companies are updating policies!



FORBES > BUSINESS

BREAKING

Workers' ChatGPT Use Restricted At More Banks — Including Goldman, Citigroup

Brian Bushard Forbes Staff

I cover breaking news for Forbes.

Follow

Feb 24, 2023, 12:14pm EST



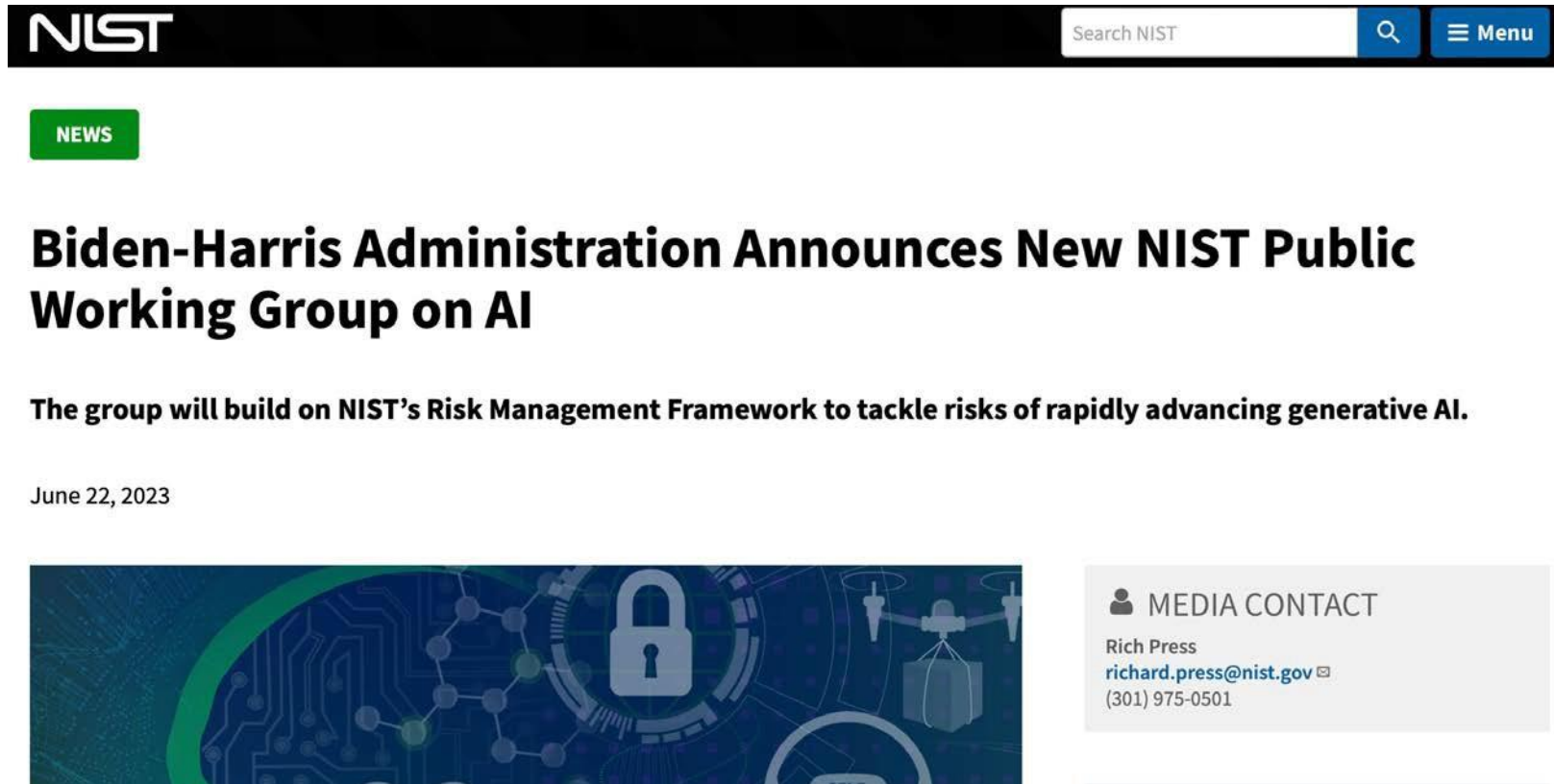
Listen to article 3 minutes





- f** **TOPLINE** CitiGroup, Bank of America, Deutsche Bank, Goldman Sachs and Wells Fargo have restricted employees' use of ChatGPT, Bloomberg and Financial News reported Friday, joining JPMorgan Chase, as well as Amazon and multiple major public school districts to limit the use of OpenAI's new chatbot, which has taken the internet by storm and raised concerns about sensitive information sharing.
- t**
- in**



Standards bodies are soliciting information



The screenshot shows the NIST website header with the logo, a search bar, and a menu. Below the header is a green 'NEWS' button. The main headline is 'Biden-Harris Administration Announces New NIST Public Working Group on AI'. A sub-headline reads: 'The group will build on NIST's Risk Management Framework to tackle risks of rapidly advancing generative AI.' The date 'June 22, 2023' is displayed. To the right of the article is a 'MEDIA CONTACT' box for Rich Press, with email 'richard.press@nist.gov' and phone '(301) 975-0501'. The article image features a blue background with a padlock, circuitry, and a drone.


NIST Search NIST   Menu

NEWS

Biden-Harris Administration Announces New NIST Public Working Group on AI

The group will build on NIST's Risk Management Framework to tackle risks of rapidly advancing generative AI.

June 22, 2023

MEDIA CONTACT
Rich Press
richard.press@nist.gov 
(301) 975-0501

<https://www.nist.gov/news-events/news/2023/06/biden-harris-administration-announces-new-nist-public-working-group-ai>



But innovation continues in the financial sector!

Morgan Stanley Wealth Management Announces Key Milestone in Innovation Journey with OpenAI

Mar 14, 2023

[Twitter](#) [LinkedIn](#) [Facebook](#) [Email](#) | [Print](#)

- **Wealth Management division developing internal-facing service that leverages OpenAI technology and Morgan Stanley's vast intellectual capital to deliver relevant content and insights into the hands of Financial Advisors in seconds, helping drive efficiency and scale**
- **Morgan Stanley currently OpenAI's only strategic client in wealth management**
- **OpenAI relationship comes on the heels of several Artificial Intelligence (AI) projects initiated in recent years**

Bloomberg

Values

Careers

Stories

Press

Find jobs



Announcements

Share [in](#) [Twitter](#) [Facebook](#)

Introducing BloombergGPT, Bloomberg's 50-billion parameter large language model, purpose-built from scratch for finance

March 30, 2023

BloombergGPT outperforms similarly-sized open models on financial NLP tasks by significant margins – without sacrificing performance on general LLM benchmarks

Ref:

<https://www.morganstanley.com/press-releases/key-milestone-in-innovation-journey-with-openai>

<https://www.bloomberg.com/company/press/bloomberggpt-50-billion-parameter-llm-tuned-finance/>

The Fundamentals

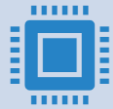


Foundation Models

- A **foundation model** is a large artificial intelligence model trained on a vast quantity of unlabeled data at scale (usually by self-supervised learning) resulting in a model that can be adapted to a wide range of downstream tasks.

Ref: https://en.wikipedia.org/wiki/Foundation_models

Large Language Models



A **large language model (LLM)** is a language model consisting of a neural network with many parameters (typically billions of weights or more), trained on large quantities of unlabeled text using self-supervised learning.



LLMs emerged around 2018 and perform well at a wide variety of tasks.



This has shifted the focus of natural language processing research away from the previous paradigm of training specialized supervised models for specific tasks.



Ref: https://en.wikipedia.org/wiki/Large_language_model



Generative AI

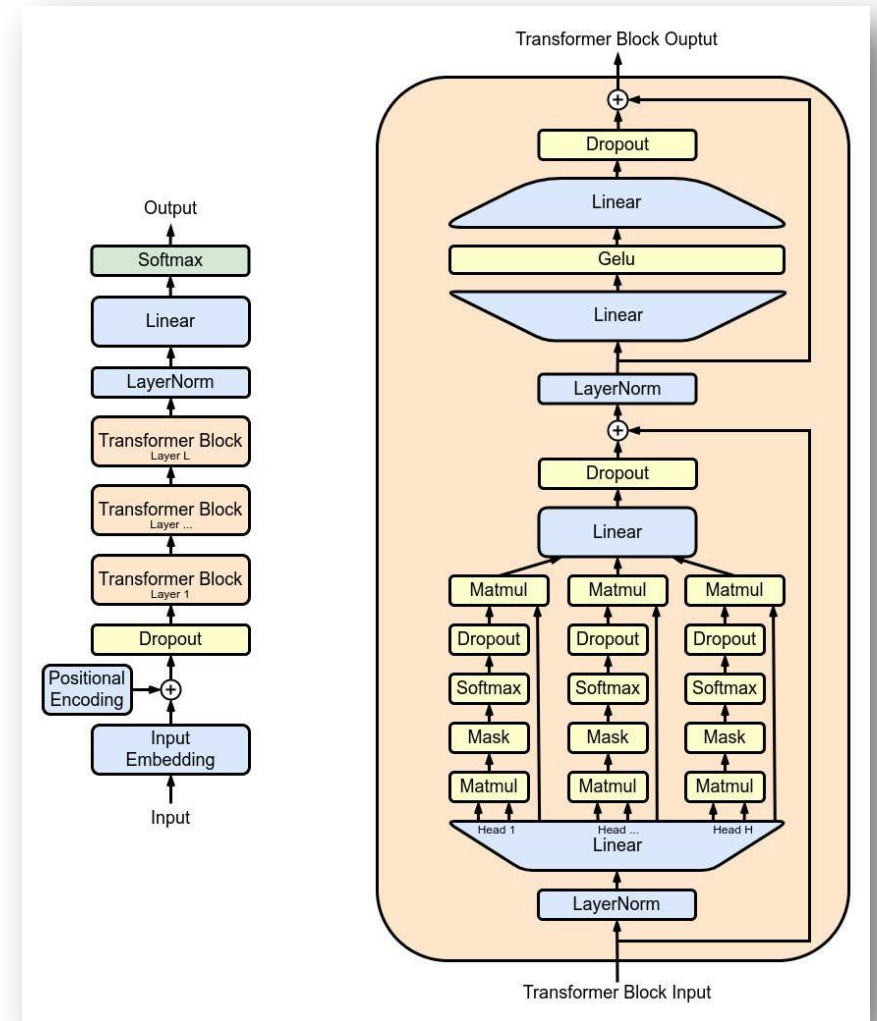
- A **generative artificial intelligence** or **generative AI** is a type of AI system capable of generating text, images, or other media in response to prompts.
- Generative AI systems use generative models such as large language models to statistically sample new data based on the training data set that was used to **create them**

Ref: https://en.wikipedia.org/wiki/Generative_artificial_intelligence

What is the GPT in ChatGPT?

- **Generative pre-trained transformers (GPT)** refer to a kind of artificial intelligence and a family of large language models.
- The subfield was initially pioneered through technological developments by OpenAI and associated offerings (e.g., ChatGPT, API services).
- GPT models can be directed to various natural language processing (NLP) tasks such as text generation, language translation, and text classification

Ref: https://en.wikipedia.org/wiki/Generative_pre-trained_transformer



The image displays the OpenAI GPT Store interface on both desktop and mobile. The desktop view shows the main 'GPTs' page with a search bar for 'Public GPTs' and a navigation menu with categories like 'Top Picks', 'DALL-E', 'Writing', 'Research & Analysis', 'Programming', 'Education', 'Productivity', and 'Lifestyle'. The 'Featured' section highlights four GPTs: AllTrails, Consensus, Code Tutor, and Books. The 'Trending' section lists four popular GPTs: DesignerGPT, Canva, ScholarAI, and AI PDF. The mobile app view shows a similar interface with a 'ChatGPT' header and a list of GPTs under 'Explore'.

GPTs

Discover and create custom versions of ChatGPT that combine instructions, extra knowledge, and any combination of skills.

Search Public GPTs

Top Picks DALL-E Writing Research & Analysis Programming Education Productivity Lifestyle

Featured

Curated top picks from this week

- AllTrails**: Find trails that fit your nature for your next hike, ride, or run. By alltrails.com
- Consensus**: Formerly ResearchGPT. Search 200M academic papers from Consensus, get science-based answers, and draft content with... By Consensus
- Code Tutor**: Let's code together! I'm Khanmigo Lite, by Khan Academy. I won't write the code for you, but I'll help you work things out. Can you tell me... By khanacademy.org
- Books**: Your AI guide in the world of literature and reading. By Josh Brent N. Villocido

Trending

Most popular GPTs by our community

- DesignerGPT**: Creates and hosts beautiful websites. By Pietro Schirano · 50.1k
- Canva**: Effortlessly design anything: presentations, logos, social media posts and more. By Canva · 67.3k
- ScholarAI**: Your Research Assistant - I'll help you navigate over a corpus of 200M articles, journals, and books. By scholarai.in · 50.1k
- AI PDF**: AI PDF GPT (Top PDF GPT), can handle PDF documents up to 2GB PER FILE, allows 1000s of PDF uploads on myaidrive.com. By masidrive.com · 209.5k

<https://openai.com/blog/introducing-the-gpt-store>





Grammar correction

Convert ungrammatical statements into standard English.



Parse unstructured data

Create tables from unstructured text.



Calculate time complexity

Find the time complexity of a function.



Keywords

Extract keywords from a block of text.



Python bug fixer

Find and fix bugs in source code.



Tweet classifier

Detect sentiment in a tweet.



Mood to color

Turn a text description into a color.



Summarize for a 2nd grader

Simplify text to a level appropriate for a second-grade student.



Emoji Translation

Translate regular text into emoji text.



Explain code

Explain a complicated piece of code.



Product name generator

Generate product names from a description and seed words.



Spreadsheet creator

Create spreadsheets of various kinds of data.



Airport code extractor

Extract airport codes from text.



VR fitness idea generator

Generate ideas for fitness promoting virtual reality games.



Examples



Some examples

1. Retrieval Augmented Generation
2. Custom GPTs
 1. BloombergGPT
 2. IndexGPT
 3. DocLLM
3. Virtual Financial Assistants
4. Class



1. Research tool

Morgan Stanley Wealth Management Announces Key Milestone in Innovation Journey with OpenAI

Mar 14, 2023

    |  Print

- **Wealth Management division developing internal-facing service that leverages OpenAI technology and Morgan Stanley's vast intellectual capital to deliver relevant content and insights into the hands of Financial Advisors in seconds, helping drive efficiency and scale**
- **Morgan Stanley currently OpenAI's only strategic client in wealth management**
- **OpenAI relationship comes on the heels of several Artificial Intelligence (AI) projects initiated in recent years**

Ref:

<https://www.morganstanley.com/press-releases/key-milestone-in-innovation-journey-with-openai>

Retrieval Augmented Generation (RAG)



Scrape a website



Chunk it into 500 character strings



Compute the Embeddings for all the chunks



Get the question from a user



Compute embeddings for the question



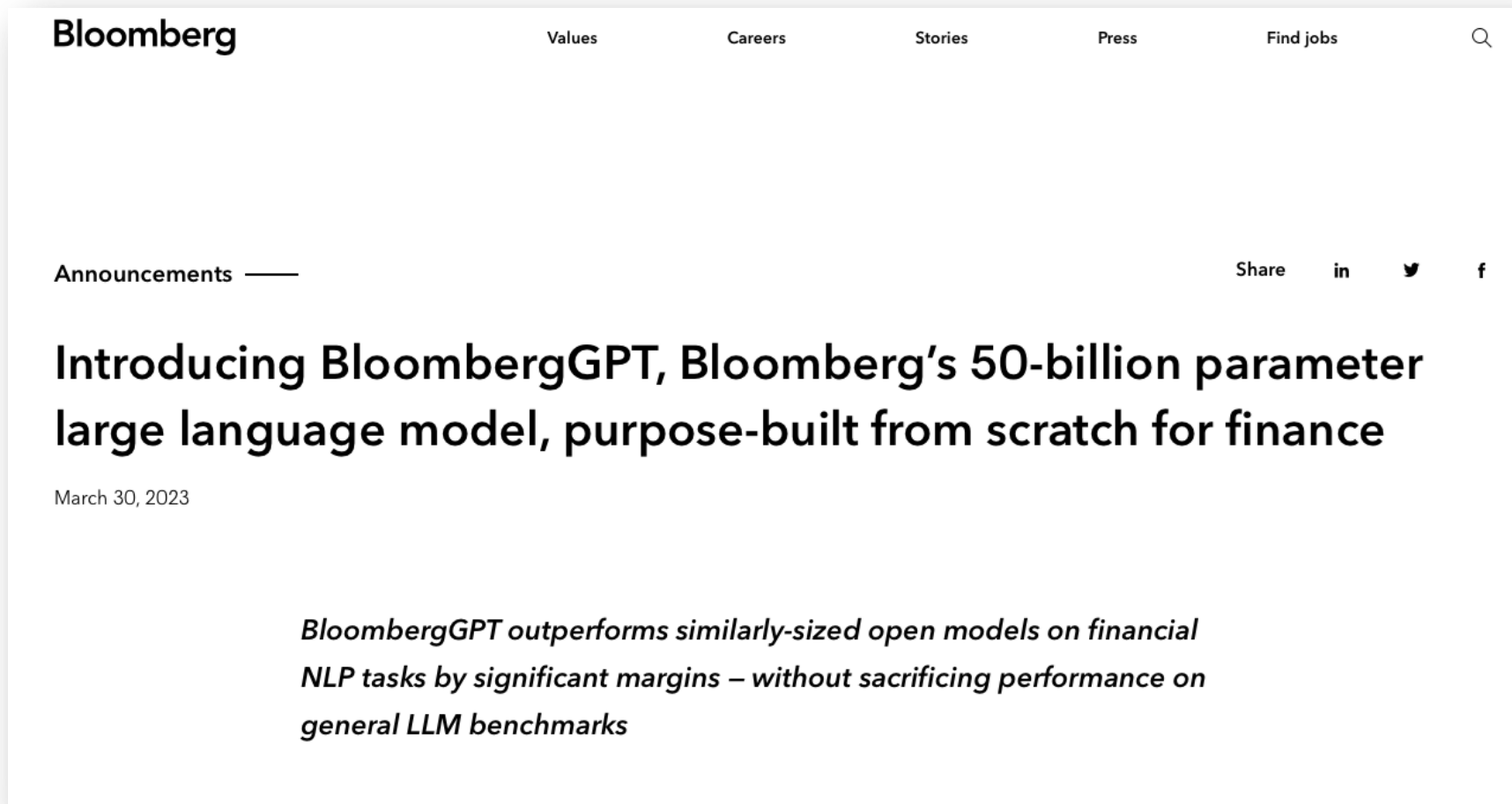
Find embeddings that are “similar” to the embeddings under consideration



Pass the question and the text chunks with similar embeddings to the GPT-5 model to get back a response





2. CustomGPTs : BloombergGPT



The image shows a screenshot of the Bloomberg website. At the top left is the "Bloomberg" logo. To its right are navigation links: "Values", "Careers", "Stories", "Press", and "Find jobs". A search icon is in the top right corner. Below the navigation is a section titled "Announcements" with a horizontal line. To the right of this section are social media sharing options: "Share", "in", a Twitter icon, and a Facebook icon. The main headline reads: "Introducing BloombergGPT, Bloomberg's 50-billion parameter large language model, purpose-built from scratch for finance". Below the headline is the date "March 30, 2023". At the bottom of the announcement is a quote: "BloombergGPT outperforms similarly-sized open models on financial NLP tasks by significant margins – without sacrificing performance on general LLM benchmarks".

Bloomberg Values Careers Stories Press Find jobs

Announcements — Share in  

Introducing BloombergGPT, Bloomberg's 50-billion parameter large language model, purpose-built from scratch for finance

March 30, 2023

BloombergGPT outperforms similarly-sized open models on financial NLP tasks by significant margins – without sacrificing performance on general LLM benchmarks

Ref:

<https://www.bloomberg.com/company/press/bloomberggpt-50-billion-parameter-llm-tuned-finance/>

2. CustomGPTs: IndexGPT

FINANCE

JPMorgan is developing a ChatGPT-like A.I. service that gives investment advice

PUBLISHED THU, MAY 25 2023-5:50 PM EDT | UPDATED THU, MAY 25 2023-AT 6:03 EDT



SHARE    

KEY POINTS

- JPMorgan Chase is developing a ChatGPT-like software service that leans on a disruptive form of artificial intelligence to select investments for customers, CNBC has learned.
- The company applied to trademark a product called IndexGPT earlier this month, according to a filing from the New York-based bank.

 **Worldwide Exchange** 
UP NEXT | **Squawk Box** 06:00 a



Ref:

<https://www.cnbc.com/2023/05/25/jpmorgan-develops-ai-investment-advisor.html>

2. DocLLM

RESEARCH AI TECH

JPMorgan Introduces DocLLM for Better Multimodal Document Understanding

The model may enable more automated document processing and analysis for financial institutions and other document-intensive businesses going forward



CHRIS MCKAY


JANUARY 2, 2024 · 2 MIN READ


J.P.Morgan | CHASE 

Ref:

<https://www.maginate.com/article/jpmorgan-introduces-docllm-for-better-multimodal-document-understanding/>


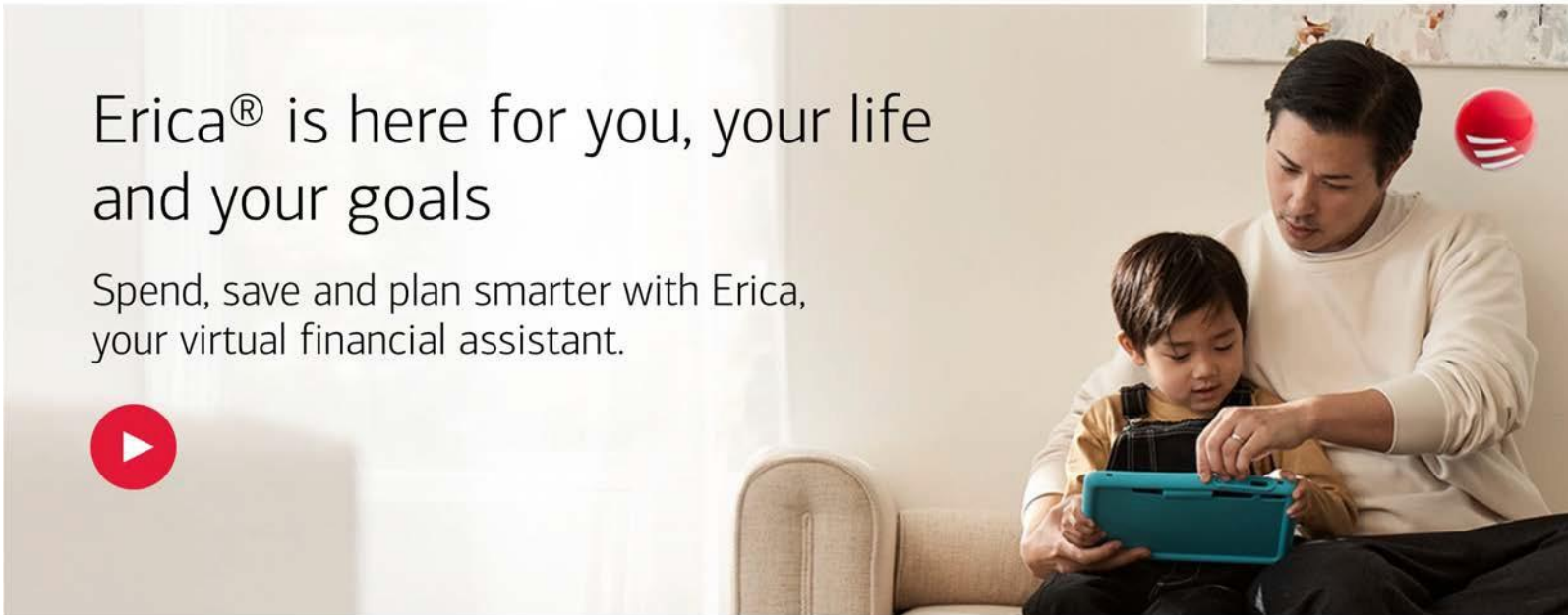
3. Virtual Financial Assistant

BANK OF AMERICA 

Mobile Banking  Erica® Mobile Check Deposit Bill Pay

Erica® is here for you, your life and your goals

Spend, save and plan smarter with Erica, your virtual financial assistant.



Ref:

https://promotions.bankofamerica.com/consumer/ericabyourside?cm_mmc=OLB-Mobile-Banking--Google-PS--bofa_eric--Brand_Erica&gclid=Cj0KCQiAwbitBhDIARIsABfFYILw8GzhARumSdItO9KH2S44wdf-RBCyTnHkGHKjO7vng4MI67ESnn8aAliDEALw_wcB&gclid=aw.ds

4. Possibilities!

3. ****Personalized Healthcare Recommendations System**** 🧴
 - Focus on personalized medicine and AI-driven recommendations.
 - Tech Stack: Airflow, FastAPI, Pinecone, OpenAI, Streamlit, Snowflake, PostgreSQL, Docker.
 - Github: <https://lnkd.in/eurSn-bs>

4. ****StyleLink: Personalized Fashion Discovery Platform**** 👗
 - Enhances online shopping with image recognition and NLP.
 - Tech Stack: Airflow, FastAPI, Langchain, Pinecone, OpenAI, Streamlit, MySQL, Docker.
 - Github: <https://lnkd.in/eB4kN57w>

5. ****Shakespearify - Shakespeare Play Illustration**** 🎭
 - Adapts Shakespearean works for modern digital media.
 - Tech Stack: Airflow, FastAPI, Langchain, Stable Diffusion, OpenAI, Streamlit, Docker.
 - Github: <https://lnkd.in/e6pBnPvd>

6. ****YelpoBot Explorer**** 🗺️



The Risks



ATLAS™

The ATLAS Matrix below shows the progression of tactics used in attacks as columns from left to right, with ML techniques belonging to each tactic below.

& indicates an adaptation from ATT&CK. Click on links to learn more about each item, or view ATLAS tactics and techniques using the links at the top navigation bar.

Reconnaissance & 5 techniques	Resource Development & 7 techniques	Initial Access & 4 techniques	ML Model Access 4 techniques	Execution & 2 techniques	Persistence & 2 techniques	Defense Evasion & 1 technique	Discovery & 3 techniques	Collection & 3 techniques	ML Attack Staging 4 techniques	Exfiltration & 2 techniques	Impact & 7 techniques
Search for Victim's Publicly Available Research Materials	Acquire Public ML Artifacts	ML Supply Chain Compromise	ML Model Inference API Access	User Execution &	Poison Training Data	Evade ML Model	Discover ML Model Ontology	ML Artifact Collection	Create Proxy ML Model	Exfiltration via ML Inference API	Evade ML Model
Search for Publicly Available Adversarial Vulnerability Analysis	Obtain Capabilities &	Valid Accounts &	ML-Enabled Product or Service	Command and Scripting Interpreter &	Backdoor ML Model		Discover ML Model Family	Data from Information Repositories &	Backdoor ML Model	Exfiltration via Cyber Means	Denial of ML Service
Search Victim-Owned Websites	Develop Adversarial ML Attack Capabilities	Evade ML Model	Physical Environment Access				Discover ML Artifacts	Data from Local System &	Verify Attack		Spamming ML System with Chaff Data
Search Application Repositories	Acquire Infrastructure	Exploit Public-Facing Application &	Full ML Model Access						Craft Adversarial Data		Erode ML Model Integrity
Active Scanning &	Publish Poisoned Datasets										Cost Harvesting
	Poison Training Data										ML Intellectual Property Theft
	Establish Accounts &										System Misuse for External Effect

Ref:

<https://atlas.mitre.org/matrices/ATLAS/>

OWASP Top 10 for LLM

LLM01

Prompt Injection

This manipulates a large language model (LLM) through crafty inputs, causing unintended actions by the LLM. Direct injections overwrite system prompts, while indirect ones manipulate inputs from external sources.

LLM02

Insecure Output Handling

This vulnerability occurs when an LLM output is accepted without scrutiny, exposing backend systems. Misuse may lead to severe consequences like XSS, CSRF, SSRF, privilege escalation, or remote code execution.

LLM03

Training Data Poisoning

Training data poisoning refers to manipulating the data or fine-tuning process to introduce vulnerabilities, backdoors or biases that could compromise the model's security, effectiveness or ethical behavior.

LLM04

Model Denial of Service

Attackers cause resource-heavy operations on LLMs, leading to service degradation or high costs. The vulnerability is magnified due to the resource-intensive nature of LLMs and unpredictability of user inputs.

LLM05

Supply Chain Vulnerabilities

LLM application lifecycle can be compromised by vulnerable components or services, leading to security attacks. Using third-party datasets, pre-trained models, and plugins add vulnerabilities.

LLM06

Sensitive Information Disclosure

LLM's may inadvertently reveal confidential data in its responses, leading to unauthorized data access, privacy violations, and security breaches. Implement data sanitization and strict user policies to mitigate this.

LLM07

Insecure Plugin Design

LLM plugins can have insecure inputs and insufficient access control due to lack of application control. Attackers can exploit these vulnerabilities, resulting in severe consequences like remote code execution.

LLM08

Excessive Agency

LLM-based systems may undertake actions leading to unintended consequences. The issue arises from excessive functionality, permissions, or autonomy granted to the LLM-based systems.

LLM09

Overreliance

Systems or people overly depending on LLMs without oversight may face misinformation, miscommunication, legal issues, and security vulnerabilities due to incorrect or inappropriate content generated by LLMs.

LLM10

Model Theft

This involves unauthorized access, copying, or exfiltration of proprietary LLM models. The impact includes economic losses, compromised competitive advantage, and potential access to sensitive information.



Insights from the QuantUniversity-Truera roundtable

1. LLMs in financial institutions are preferred for information retrieval, contextual search, and operational automation, with caution in client-facing applications due to reliability concerns.
2. Information retrieval use case emphasized with human-in-the-loop to ensure answer adequacy.
3. Risks like accuracy, hallucinations, and security issues identified with LLMs, especially concerns on mathematical abilities and misuse potential.
4. Managing LLM risks entails robust controls, unsupervised LLM use restrictions, and robust MRM controls, with confidence in information retrieval risk management.
5. LLMs affect job roles notably for data scientists and coders, heralding significant changes in job functions and data science





What will you build
with Generative AI
?





Sri Krishnamurthy,
CFA Founder and CEO
QuantUniversity



- Founder of www.QuantUniversity.com
- Advisory and Consultancy for Financial Analytics
- Prior Experience at MathWorks, Citigroup and Endecca and 25+ financial services and energy customers.
- Columnist for the [Wilmott Magazine](#)
- Author of forthcoming book [“AI Risk Management \(Wiley\)”](#)
- Chartered Financial Analyst and Certified Analytics Professional
- Teaches Data Science and Fintech related topics at [Northeastern University, Boston](#)



QuantUniversity, LLC

www.quantuniversity.com

Thank you!

Contact

sri@quantuniversity.com

www.QuantUniversity.com

[m](#)



Innovations and FinTech Developments That Can Enhance Financial Security, Retirement Planning, and Spending Down Assets



Tyler End
CEO
Retirable



Kevin Nazemi
Founder & CEO
Charlie



Yon Perullo
CEO
RiXtrema, Inc.



Laurel Taylor
Founder & CEO
Candidly



Eric Stevenson
President
Nationwide Retirement

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 **Milliman**

 **Nationwide**

 **ONEAMERICA**

 **PGIM**

 **Principal**SM

Plan Sponsor View — Supporting Employee Financial Wellness



Josh Jessup
GM Global Retirement & Financial
Wellness, Delta Air Lines



Justin Roberts
Principal, Global Financial
Health Amazon



Chantel Sheaks
Vice President, Retirement Policy,
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 **ONEAMERICA**

 **PGIM**

 **Principal**SM

Employee discount programs, basic money management tools, and financial investment education are the most offered benefits. Few are currently offering debt or short-term loan benefits.

Financial Wellbeing Benefits Offered



Q15. Does your company offer or plan to offer any of the following financial wellbeing or debt assistance benefits to employees? (n=252)
 Q20. Which of the following does your company offer to help employees with personal financial challenges? (n=252)

Lunchtime Session: C-Suite View



Ken Mungan
Chairman, Milliman



Ed Murphy
President and CEO, Empower



Jon Kessler
President and CEO,
HealthEquity



Stephanie Dhue
Senior Producer, CNBC

**Research
Presentations:
Discussions of EBRI
and Milken Institute
Research**



Craig Copeland
Director, Wealth Benefits
Research, EBRI



Cheryl Evans
Director, Lifetime
Financial Security, MI
Finance, Milken Institute



**MILKEN
INSTITUTE**
CENTER FOR
FINANCIAL MARKETS

Lifetime Financial Security Program MI Finance

January 23, 2024

A Shared Mission

Milken Institute

Nonpartisan, nonprofit, action-oriented think tank

Accelerating - measurable progress on the path to a meaningful life.

Focusing on - financial, physical, mental, and environmental health.

Bringing together - the best ideas and innovative resources to develop blueprints for tackling some of our most critical global issues through the lens of what's pressing now and what's coming next.

MI Finance

Focuses on using finance as a force for good

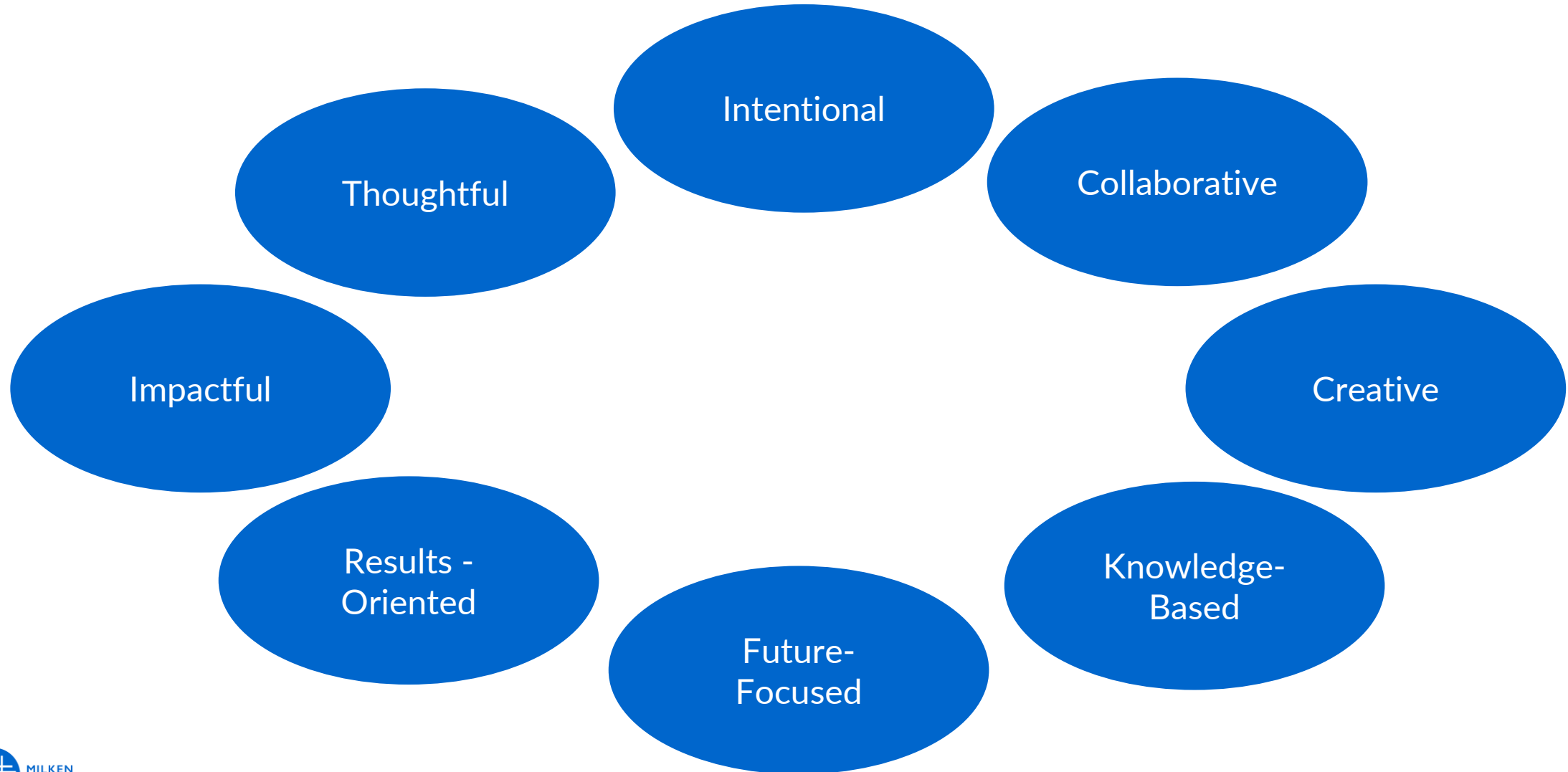
Conducts research and constructs programs designed to facilitate the smooth and efficient operation of the financial markets – to help ensure that they are fair and available to those who need them when they need them.

Program areas:

Lifetime Financial Security, FinTech, Inclusive Capitalism, Financial Innovations Labs, Public Finance, Geo-Economics, Small Business, Economic Mobility



MI Finance fulfills its goals by developing work products and supporting work that is:



Strategies

- Agile and Forward-Looking
- Convene Policy Makers
- Convene Leaders In Finance and Business
- Convene Academics and other Experts
- Research
- Public Dialogue
- Working Groups
- Advisory Councils
- Events
- Media and Social Media Outreach

Making the Case for Change:

Some Statistics

The world's population is becoming older while longevity is increasing.

- By the year 2030, more people worldwide will be over the age of 60 than under 10.
- In 2024, 25% of American workers will be 55+ years, and by 2024, Americans 65+ will number 80 million.
- Those aged 65 in OECD countries can expect to live another 19.7 years.

Women and people of color face an even greater threshold for retirement preparedness.

- Women are at greater risk of not achieving a financially secure retirement than men due to gender wage gaps and caregiving responsibilities.
- Women, on average, have saved 30% less than men, and women live five years longer than men.
- The racial retirement gap is real, and employers pay people of color almost 15% less than their white counterparts.

Health Care is a significant expense for which many have not planned.

- The average couple age 65 in 2021 will likely need \$300,000 to cover healthcare expenses in retirement.
- Most Americans have not planned for long-term care, and over 70% of those aged 65 will need to pay for long-term care.

Making the Case for Change:

Some Statistics

The Pandemic set many back in their ability to plan.

- Many Americans decreased their retirement savings during the pandemic.
- In early 2021, more than 14 million Americans stopped making monthly retirement contributions and others reduced their contributions or withdrew retirement funds during the pandemic.

The average American does not have adequate savings to support retirement.

- 25% of all US households have no retirement savings at all.
- 61% of retirees said they wish they had planned better for the financial aspects of retirement.
- 53% of those working for companies with 50 or fewer employees have no employer retirement savings plan.

Education on Retirement savings products is key.

- Financial literacy positively affects involvement with pensions and the quality of pension and retirement-related decisions.
- Those with a financial plan are 2 ½ times more likely to save enough money for retirement.

Lifetime Financial Security Defined:

Shifting the Retirement Paradigm: Moving Towards Lifetime Financial Security

1. Having the financial ability to pay recurring monthly expenses.
2. Having the funds to pay for adequate housing.
3. Having the ability to absorb a financial shock (e.g., job loss or unexpected expense, such as a major car or home repair).
4. Setting and meeting both short-term and long-term financial goals.
5. Having a tax-deferred savings plan to save for the end of your traditional work life.
6. Being financially prepared for long-term medical costs.
7. Being comfortable with the lifestyle you live and can afford.

Connections

- Inclusive Capitalism
- Financial Innovation
- New Strategies for Longer Work Lives
- Global Pension Strategies
- FinTech Applications
- Financial Education
- Public Policy Making

Ensuring a Safe, Secure Retirement is Within Reach for All

Focus Areas:

- Retirement investment vehicles for all
- Financial education focused on planning for a financially secure future
- Retirement savings gap affecting women
- The racial wealth gap and its impact on retirement savings
- Increasing awareness of and vehicles to fund medical costs for older Americans
- Changes to tax provisions and other savings plan changes to increase retirement funds
- Tech and other innovative options to engage younger people to save for the future
- Engaging with employers to facilitate longer work lives due to longevity
- Access to long-term care insurance

Cheryl Evans, JD, LLM

Director, Lifetime Financial Security Program

MI Finance

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Retirement Security Projection Model: Assessing the Impact of SECURE on Retirement Security

EBRI-Milken Institute Retirement Symposium

January 23, 2024

Retirement Security Projection Model (RSPM[®]) — Introduction

- Originally developed in the late 1990s to determine the number and percentage of individuals who would qualify for Medicaid in select states.
- RSPM was expanded to a national model, with the first results released in 2003.
- Given its origin, along with accounting for investment risk and longevity risk, it also includes the risk of long-term health care costs through a stochastic simulation model.
- Uses all retirement plan income/assets (including current law Social Security benefits) plus home equity to compare against average deterministic costs in retirement plus stochastic long-term health care costs to see if each individual ages 35-64 has sufficient income to cover the simulated expenses throughout retirement.

Retirement Security Projection Model (RSPM[®]) — Introduction

Output Metrics

- **Retirement Readiness Rating (RRR)** — share of individuals projected to not run short of money in retirement
- **Average/Aggregate Retirement Savings Shortfalls (RSS-)** — average or total amount of money by which individuals run short of covering the projected expenses in retirement
- **Average/Aggregate Retirement Savings Surpluses (RSS+)** — average or total amount of money above what is needed to cover all projected expenses in retirement
- **Retirement Savings Net Outcomes (RSNO)** — the net outcome for all households (RSS+ minus RSS-)

RSPM Updates and SECURE 2.0

A recent prior update added Health Savings Accounts (HSAs) as a source of retirement income under a grant from the TIAA Institute that was released this summer. HSAs will continue to be a source of retirement income in RSPM.

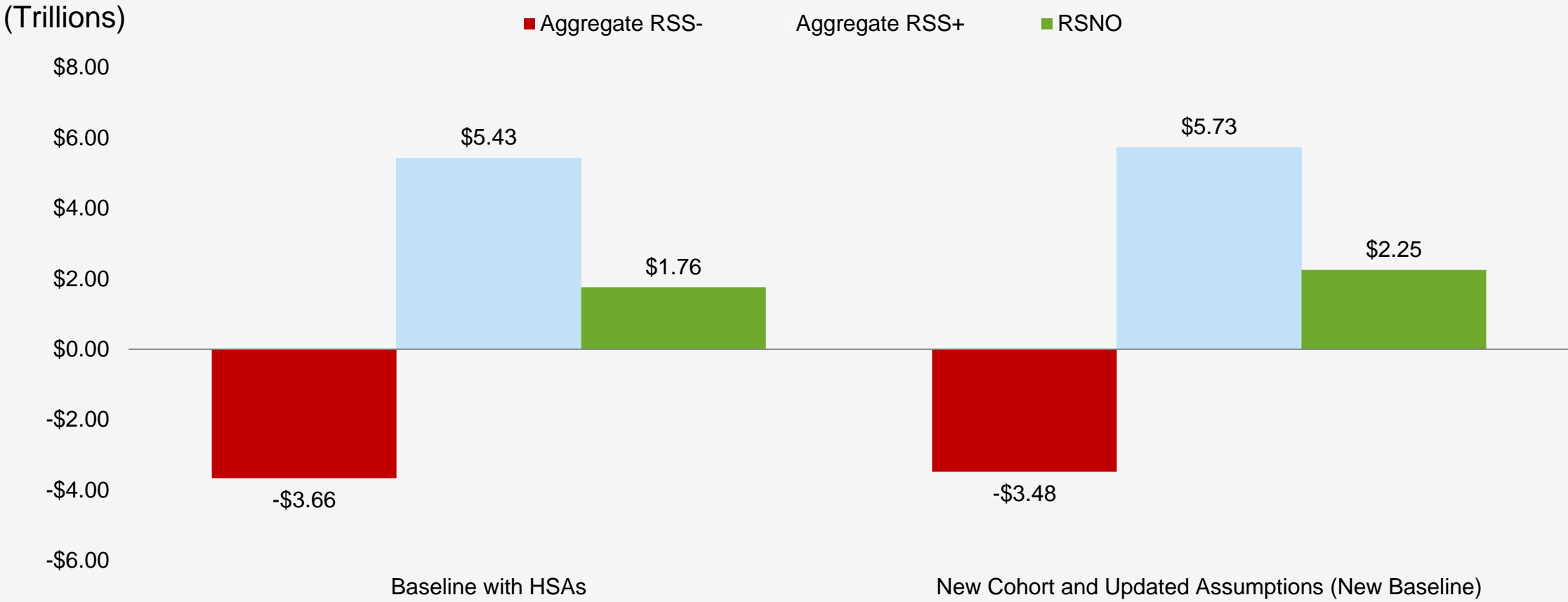
NEW Updates

- New cohort and updated assumptions
- SECURE Provisions
 - Coverage enhancements (tax credits, MEPs/PEPs, spillover effect of state-run auto-IRA plans)
 - Automatic enrollment in new plans
 - SAVER's match
 - Roth catch-up contributions and increases for those ages 60-63
 - Indexed IRA catch-up contributions
 - \$1,000 emergency savings withdrawals

More provisions to be added

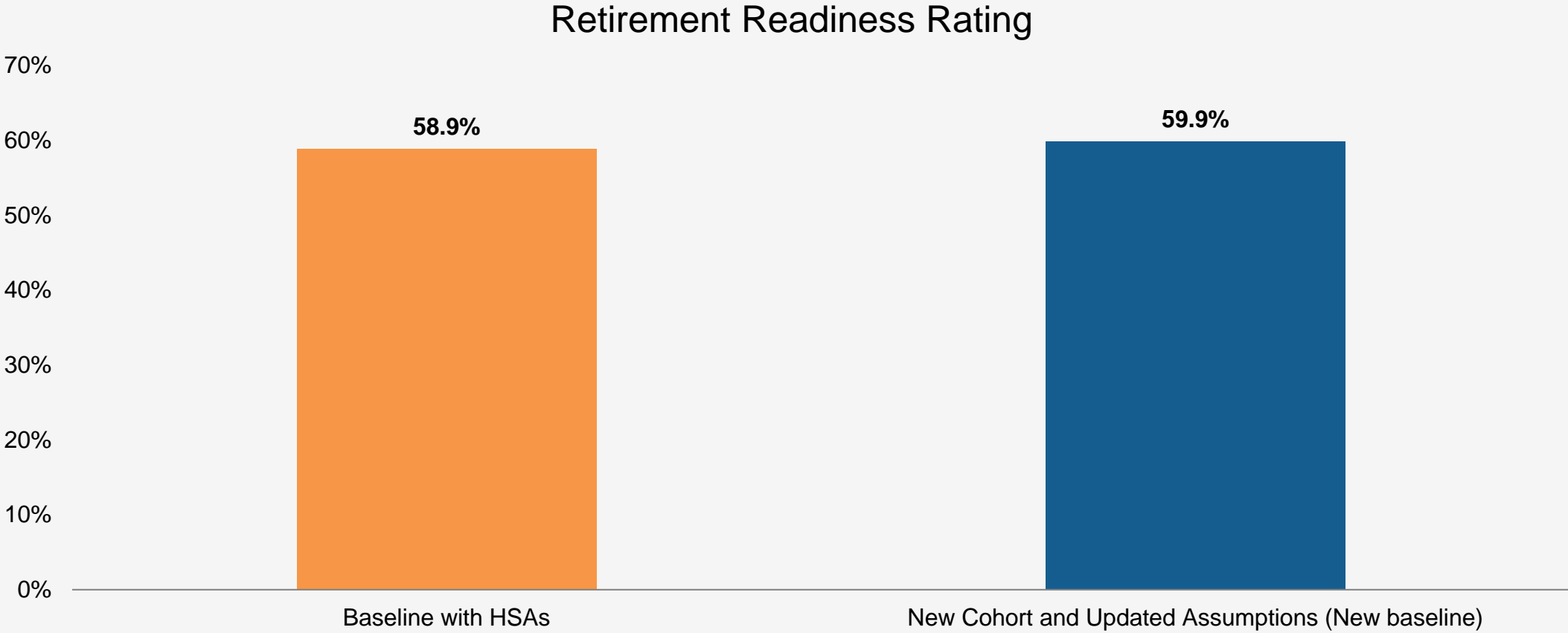
- Income options — immediate annuities and QLACs
- Auto portability
- Pension-linked emergency savings accounts

Aggregate Retirement Savings Shortfalls (RSS-), Surpluses (RSS+), and Net Outcomes (RSNO) — New Cohort and Updated Assumptions Compared With Old Baseline



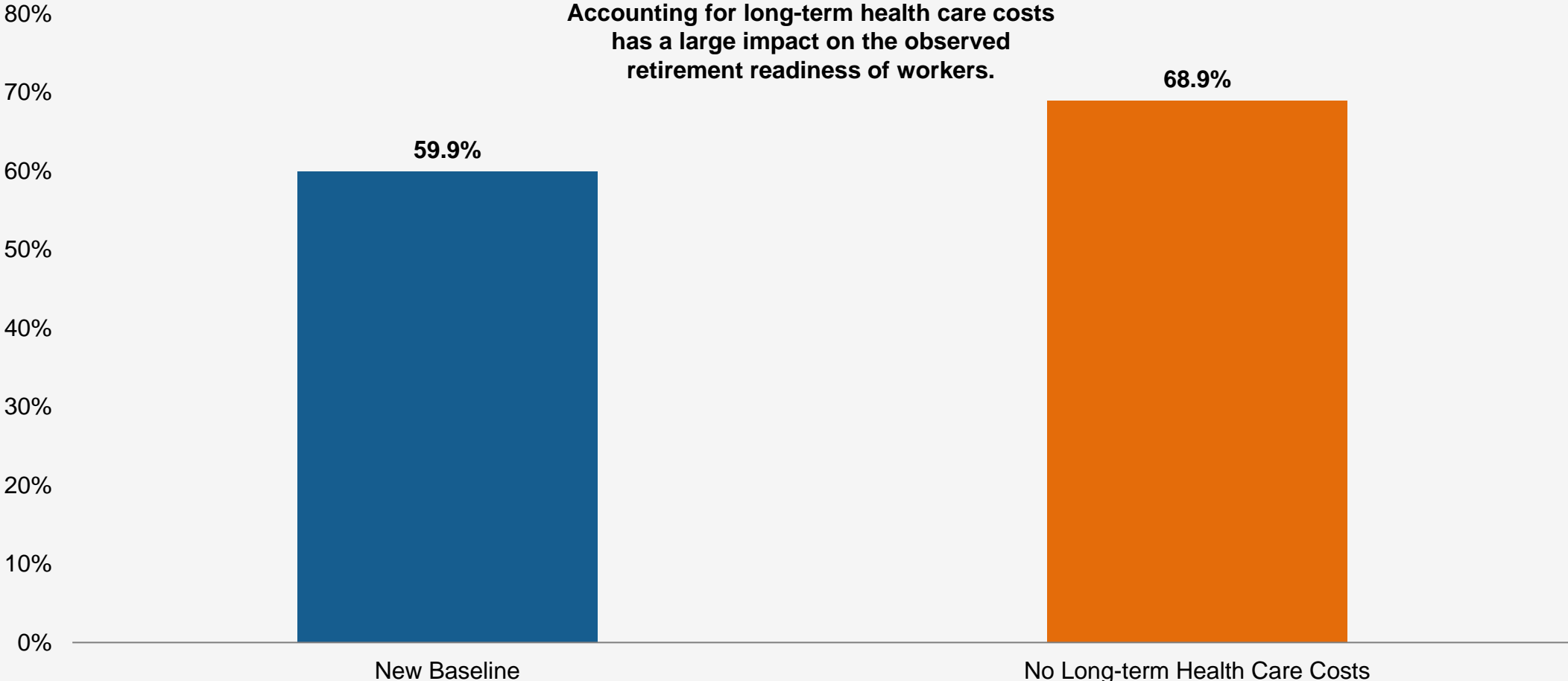
Source: RSPM

Retirement Readiness Ratings (RRR) — New Cohort and Updated Assumptions Compared With Old Baseline



Source: RSPM

Impact of Long-Term Health Care Costs, a Major Component of RSPM, on the Retirement Readiness Rating (RRR)

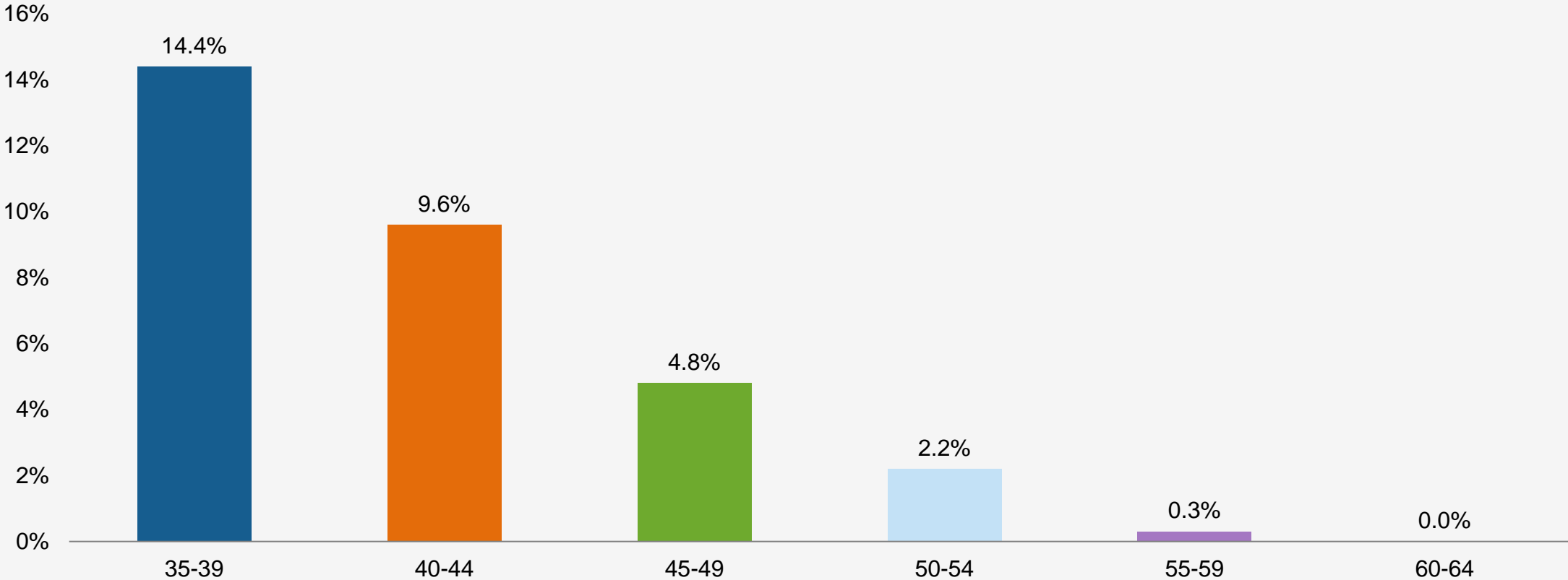


Source: RSPM

SECURE PROVISIONS

SECURE Provisions — SAVER's Match With Auto-Enrollment in New Plans

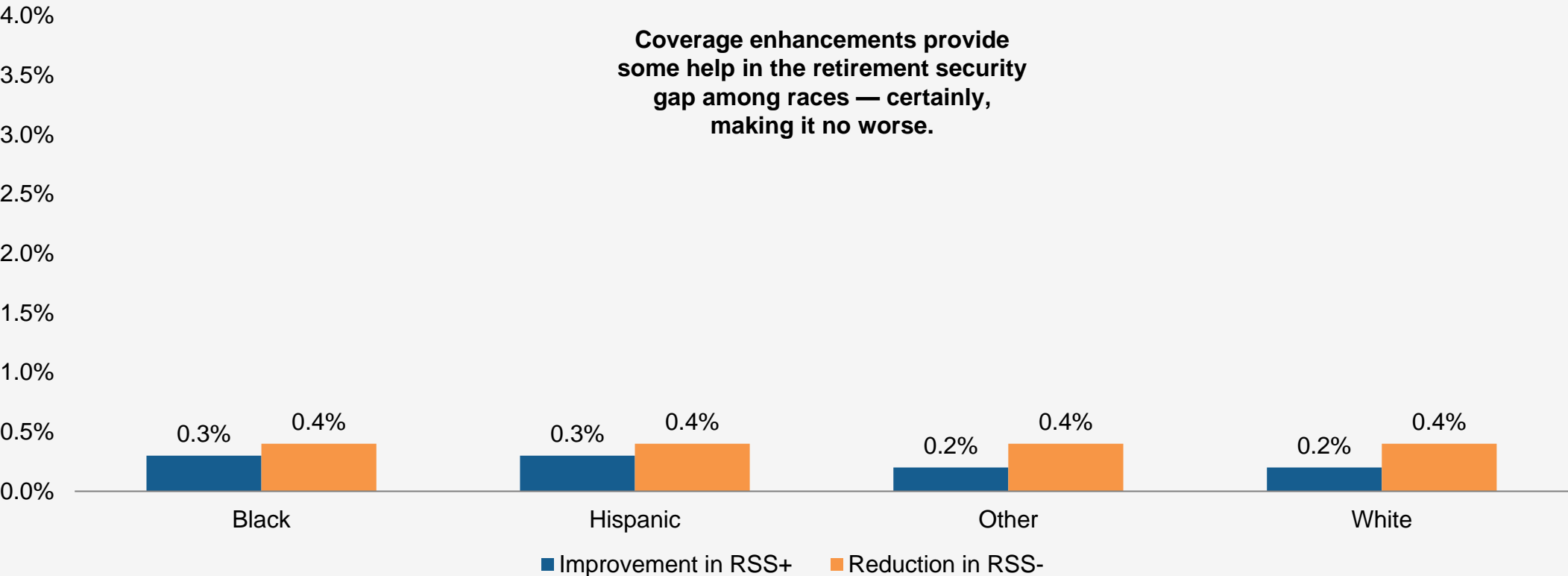
Reduction in RSS-, by Age



Source: RSPM

SECURE Provisions-Coverage Enhancements (Tax Credits, MEPs/PEPs, Spillover Effect of State Run Auto-IRA Plans)

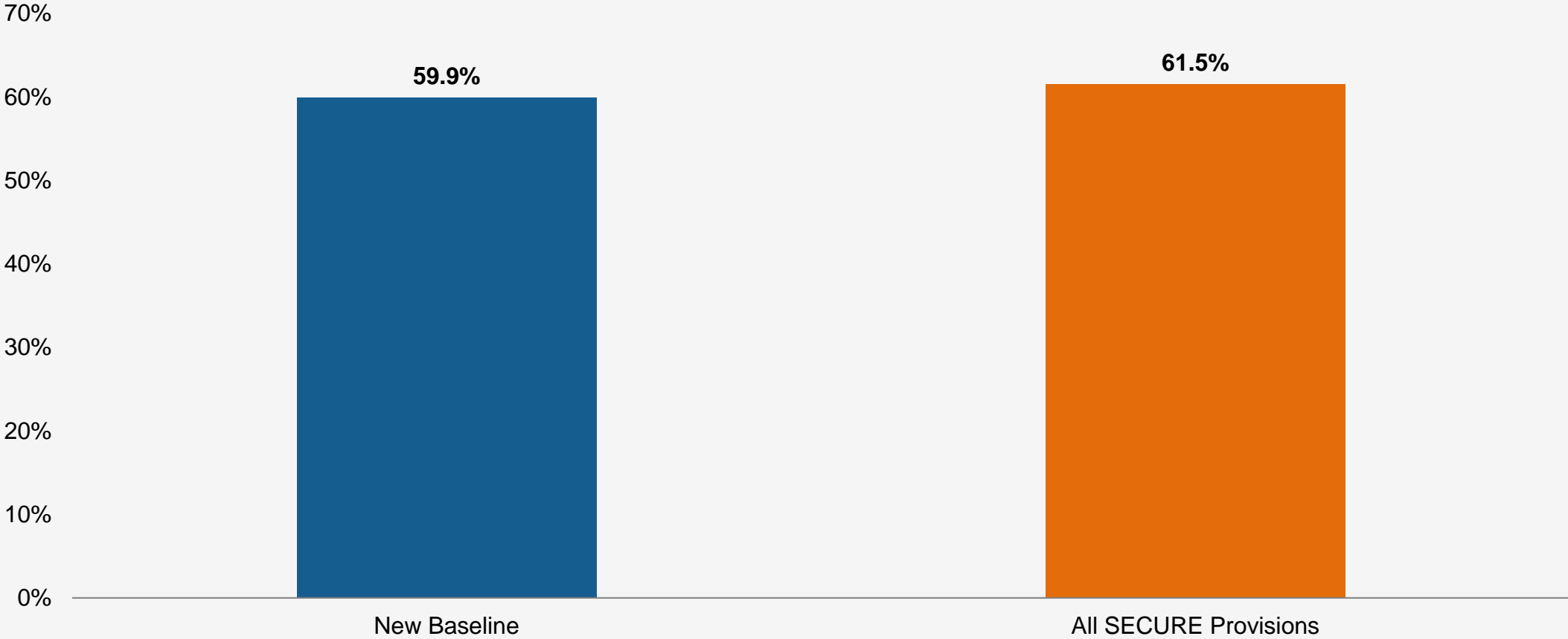
Increase in RSS- and RSS+, by Race/Ethnicity



(Over \$30 billion in 2021\$ improvement)

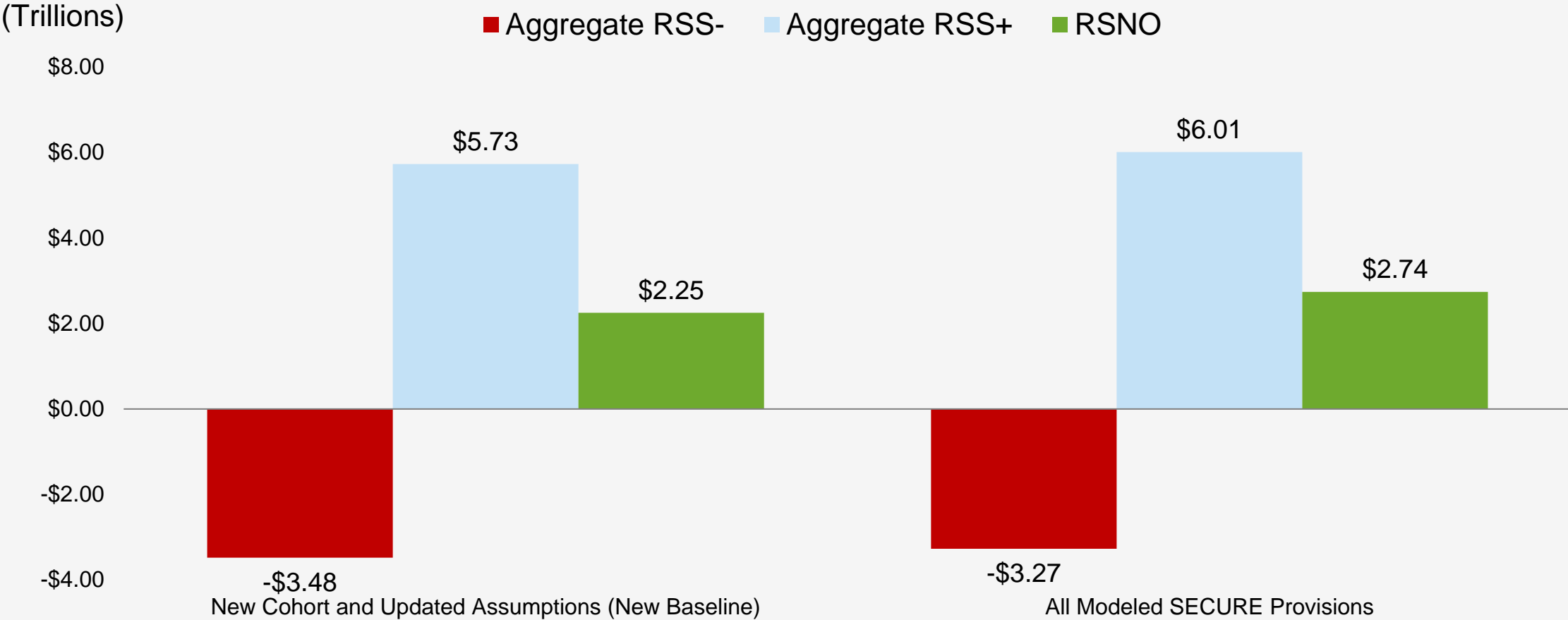
Source: RSPM

Retirement Readiness Rating (RRR) — All Modeled SECURE Provisions (Full Cohort)



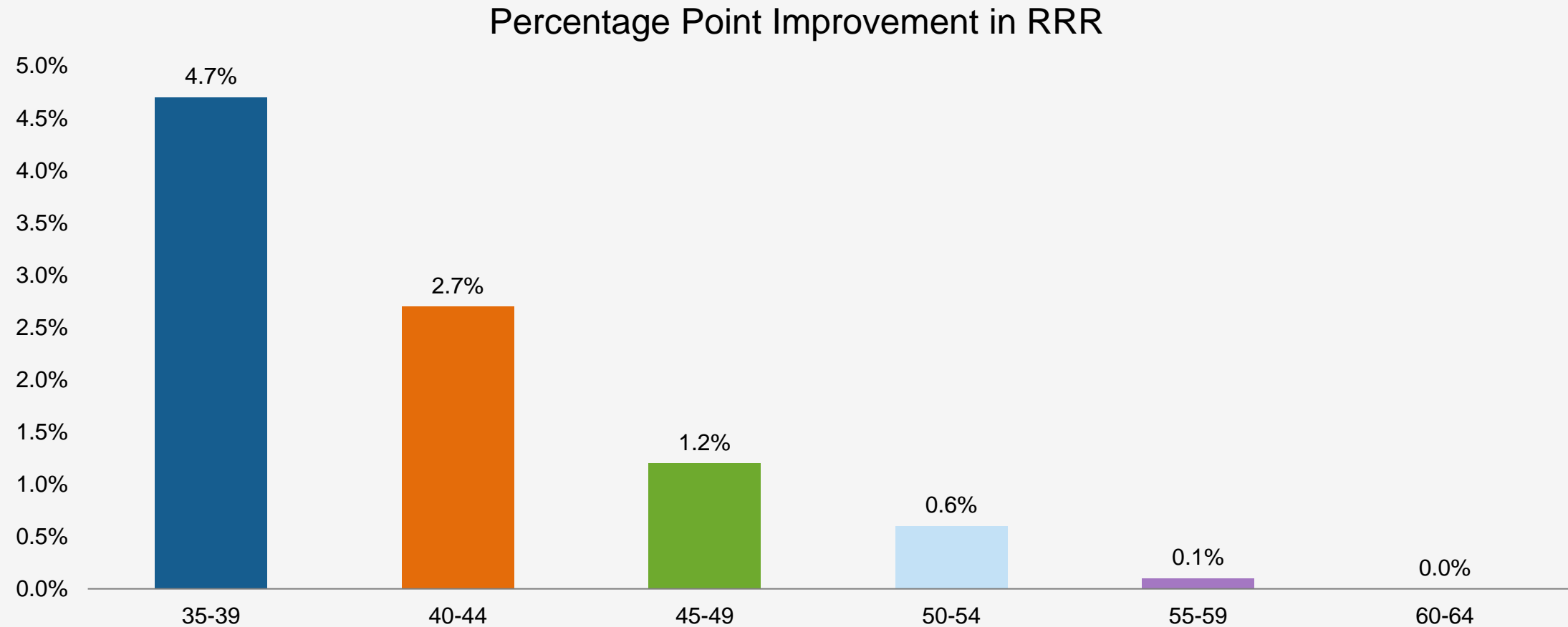
Source: RSPM

Aggregate RSS-, Aggregate RSS+, and RSNO — Updated Assumptions Compared With Old Baseline and All Modeled SECURE Provisions



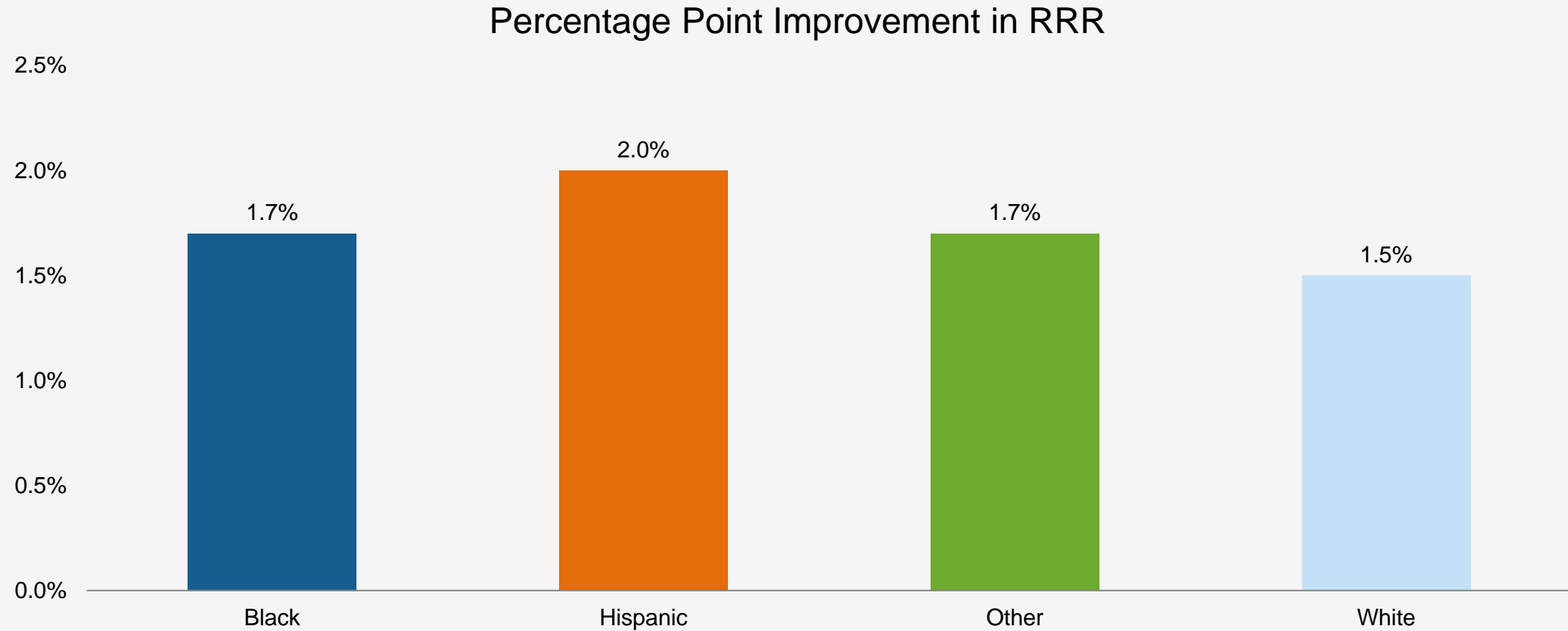
Source: RSPM

RRR Percentage Point Improvement — All Modeled SECURE Provisions, by Age



Source: RSPM

RRR Percentage Point Improvement — All Modeled SECURE Provisions, by Race/Ethnicity



Source: RSPM

Takeaways and Further Study

SECURE moves the needle forward on retirement security.

- The youngest cohorts are the most impacted, with larger improvements in the RRR and average retirement savings shortfalls, as they have longer times remaining in the labor force to benefit from the new provisions.
- The SAVER's match with automatic enrollment has a particularly large impact on improving the likelihood of individuals to not run short of money in retirement.
- SECURE provides some help in reducing the gaps in retirement readiness among those of different races/ethnicities.
- Other provisions in SECURE have the potential to make additional improvements in retirement readiness on top of those currently modeled.

Future studies

- How can different drawdown strategies impact retirement readiness, including the use of different income options (immediate annuities and QLACs)?
- Effects of auto portability on retirement readiness through the consolidation and preservation of accounts
- Impact of pension-linked emergency savings accounts

Policy Update From Former Capitol Hill Staff



Kendra Isaacson

Principal
Mindset



Michael Piowar

Executive Vice
President, MI Finance,
Milken Institute

Thoughts on U.S. Social Security Policy Issues



Kilolo Kijakazi
Deputy Commissioner, Office
of Retirement and Disability
Policy, U.S. Social Security
Administration

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Breakout Discussions & Reports

Powering vs. Empowering Savings

How can we help employees build savings behaviors in a world of automation and defaults? How can we ensure money doesn't leave the retirement system?

Too Many Savings Choices?

How can we ensure that emergency savings, HSA, 529, etc. do not crowd out retirement savings but maximize overall savings utility? How can we help workers make smart consumer finance decisions?

Behavioral Finance on Decumulation

How can we help workers and retirees make smart decisions about how to spend money in retirement? How can retirement income products guide spending behavior?

Access and Coverage — Global Learnings

What can the U.S. learn from retirement systems outside the U.S.?

Access and Coverage — Small Business

Are government mandates, state-run IRAs, and Pooled Employer Plans working?

Financial Fluency and Equity in Saving for All: The Path to Hope and Prosperity



John Hope Bryant
CEO and Founder, Operation HOPE

Washington D.C

Although the neighborhoods of Anacostia and Au-Tenleytown are less than 13 miles apart, the relative economic outlook of these neighboring communities is vastly different. The following data shows the remarkable financial disparity between these two communities.

	Anacostia 20032	Au- Tenleytown n 20016	U.S. Average
Average Credit Score	612	742	695
Median Household Income	\$38,135	\$175,534	\$67,521
Unemployment	12.1%	3.0%	3.7%
Homeownership Rates	26%	62%	65.,8%
Median Home Value	\$204,972	\$973,793	\$428,700
Property Crime (per 1K residents)	30.4	9.5	31.2
Violent Crime (per 1K residents)	17.5	1.1	4.0
HS Graduation Rate	72%	97%	85.3%
Life Expectancy	69	83	79.1



HOPE Credit Score Communities Impacts



HOPE Inside | Greater Washington D.C. - By the Numbers

612	Average beginning credit score for clients
+41 pts	Average increase in credit score for clients
-\$2,249	Median reduction of client debt
+\$2,271	Median increase in client savings



The Delta Emergency Savings Program

A New Model for Boosting Employee Savings and Financial Wellness



Emergency Expense Preparedness

Tackling a national challenge within Delta's walls



1 in 4



57%

Our Emergency Savings Program is one of the newest ways we're investing in our business by living up to our responsibility to care for our people. We're hearing what a meaningful difference it's already making—not just the funds themselves, but the confidence that comes from building skills around budgeting and saving.”

– **Joanne Smith**

*Executive Vice President
and Chief People Officer*

The Delta Emergency Savings Program

How it Works

- 1** Financial Skills Learning
Employees choose from three financial coaching tracks based on where they are in their financial journey.

PATH #1

Manage Day-to-Day Saving & Spending

with Operation HOPE

For employees focused on short-term goals, making ends meet or making minimum debt payments.

PATH #2

Strengthen My Financial Foundation

with Fidelity Investments

For employees who want to learn how to prioritize their financial decisions, such as whether to buy versus rent or save versus pay down debt.

PATH #3

Focus on My Future Goals

with Fidelity Investments

For employees who have a solid financial foundation and want to learn how to optimize income and assets to fulfill their longer-term goals.

Each track includes online educational modules that employees can do at their own pace, group financial sessions and one-on-one coaching sessions.

-
- 2** Financial Skills Practice
Employees set up a Fidelity Cash Management Account to be used as their emergency savings fund and choose a payroll deduction amount to begin funding it.
-
- 3** \$1,000 Contribution from Delta
Employees earn a one-time contribution of \$750 upon completing their online educational track and their first one-on-one coaching session, and an additional \$250 contribution from Delta upon reaching \$250 in savings from their payroll deductions.
-
- 4** Financial Wellness Encouragement
From there, employees are encouraged to continue contributing to their rainy-day accounts until they have the recommended 3-6 months of expenses saved up, and to apply their new financial savviness as they build their 401(k)s for retirement.

Delta Emergency Savings Program participation, nine months in

29%

of Eligible Employees
have started the
education program

33K+

Fidelity Cash Management
Accounts opened

21.5K

employees completed
the program

51%

are employees of color

\$21M

Delta contribution
incentives earned

3.5M

minutes of financial
education videos watched

37K

financial coaching
sessions attended

\$74

average payroll deduction

\$1,061

average total employee
contribution to date

Thank you for attending!
Please take a few moments
to share your feedback

