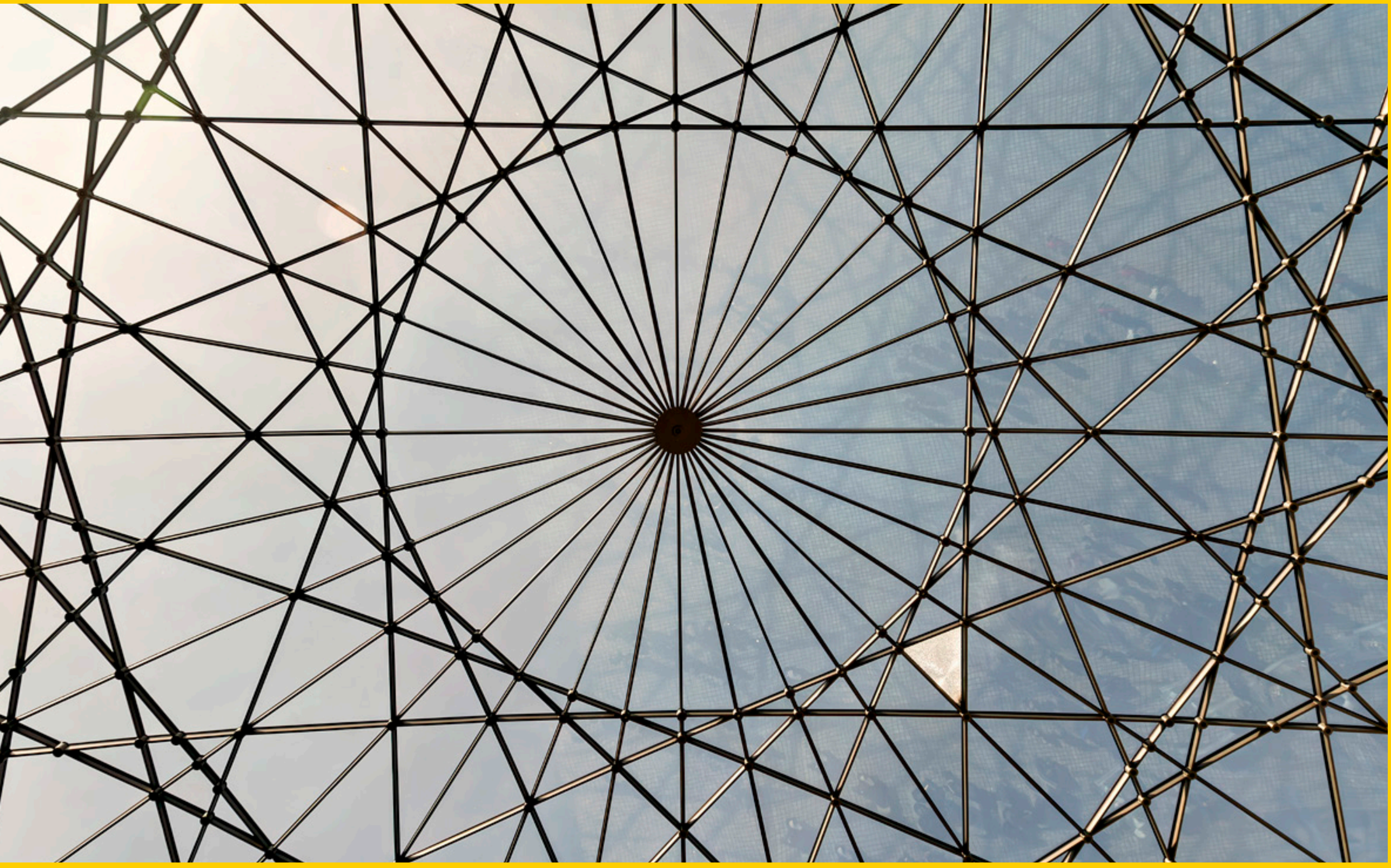
BlackRock®

The macro decoder

Using LLMs to read the world's economic narrative



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Summary

- Large language models (LLMs) are reshaping macro research, providing a level of pattern recognition and narrative understanding that traditional tools cannot match.
- While adoption in alpha generation was initially slow, recent breakthroughs can deliver measurable, practical investment value, making LLMs credible contributors to the macro investment process.
- Effective use of LLMs in macro investing requires pairing advanced AI engineering with deep economic intuition. The combination is what turns language understanding into investable signals.
- This paper shares three real-world applications where LLMs materially improve investment insight: Surfacing underappreciated analyst views, systematically measuring market consensus, and extracting actionable insights from internal investor discussions.
- Across these use cases, LLMs surface signals that were previously inaccessible: Revealing shifts in sentiment earlier than data releases, exposing market narrative divergences between macro research and markets, and converting qualitative dialogue into systematic, tradable views.
- These innovations represent just the beginning. LLMs are poised to become transformational tools for macro research and alpha generation.

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Introduction

In 2017, Google Research published "Attention is all you need," elevating the transformer architecture that ignited today's large language model (LLM) revolution in artificial intelligence.[1] While it took time for LLMs to mature into the transformative technology we know today, their integration into investment alpha generation was initially slow and underwent understandable skepticism. Early claims of "LLM alpha" often sounded more like marketing than meaningful progress.[2]

That dynamic is now shifting. Recent advances in large language models — particularly in instruction-tuning, long-context reasoning, and retrieval-augmented generation — have delivered measurable improvements in the extraction and interpretation of macroeconomic information and unlocked new, practical investment applications. In macro investing, our breakthroughs stem from pairing technical expertise in LLM infrastructure with a deep understanding of macroeconomic behavior. This combination seeks to enable us to identify and capitalize on insights that traditional models routinely miss.

This paper highlights three ways LLMs are reshaping our macro investment process:

1	**Extracting forward-looking, underappreciated views from macro market analysts**
2	**Interrogating the "market" to uncover areas of disagreement and potential mispricing**
3	**Aggregating and translating investors' collective perspectives into actionable trades**

We believe this represents only the beginning. With robust infrastructure and a growing set of innovative frameworks, we believe the opportunity for LLMs to enhance our alpha generation is vast — and still largely untapped.

Identifying underappreciated views

Several important learnings from our effort to develop effective LLM-based alpha engines have emerged; among them 1) the need for generalizable, large-scale pipelines that generate many features that can be later ensembled, 2) the need for multi-agent processes to improve accuracy of results and make the most of the smaller corpus of text data relevant to the macro investing problem.

Our **Macro Language Processing (MLP)** platform uses LLMs to uncover nuanced macro sentiment signals buried within sell-side research.

Prior technologies required the production of rigid keyword dictionaries tied to every possible aspect where we might be interested in a market sentiment measure. These were not only cumbersome to maintain but also ran the risk of missing changes to the terminology used (for example, names of new central bank governors as they were appointed, or names of new government policies like "OBBBA" or "Abenomics"), and missing relevant passages altogether when terms from the dictionary were implied and not used. Rather than depending on these dictionaries, our platform performs semantic search across a database containing millions of broker notes. This shift lets users focus on the *economic question*, rather than on building and maintaining complex linguistic taxonomies. LLMs allow us to filter to only the most relevant excerpts retrieved. The resulting process becomes both more scalable and more accurate.

1 Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., Kaiser, Ł., & Polosukhin, I. 2017. "Attention Is All You Need." *Advances in Neural Information Processing Systems* 30. Curran Associates, Inc. **2** See, for example: Ken Griffin, CEO of Citadel, cautioned that "it's just a fantasy" to think AI will replace human fund managers, adding that "it's not clear to me that we're going to get the productivity gains out of AI that the markets are broadly hoping for" (MarketWatch, "'It's just a fantasy': Citadel CEO Ken Griffin says AI will not replace human fund managers," March 13, 2024, https://www.marketwatch.com/story/its-just-a-fantasy-citadel-ceo-ken-griffin-says-ai-will-not-replace-human-fund-managers-b7c2df3b); Man Group president Steven Desmyter likewise noted that 2025 would be "the year when AI needs to prove its worth," emphasizing that "markets do need to see real-world economic impact from AI investment more broadly" (Financial News London, "Man Group president says AI needs to prove its worth in 2025," January 8, 2025, https://www.fnlondon.com/articles/man-group-president-says-ai-needs-to-prove-its-worth-in-2025-eabd4386); and a Barron's analysis found that "large language models… are poorly suited for adaptive trading due to their reliance on historical, text-based data," after ChatGPT lost about 72% of its simulated portfolio in six days ("AI Chatbots Were Told to Trade Crypto. The Returns Were Ugly," October 24, 2025, https://www.barrons.com/articles/ai-chatbots-were-told-to-trade-crypto-the-returns-were-ugly-5c6467d3).

These excerpts are then evaluated by a sequence of LLM-based scorers: First, **verifying** the snippet's relevance, next, **sorting** for an explicit forward-looking statement, and finally, **classifying** the forecast along the long/short continuum while capturing the model's rationale. Introducing multiple agents responsible for each component of the process seeks to make human evaluation of results more intuitive and improves the accuracy at the final step.

From these classified excerpts, we construct indices for each of our economic questions translating the balance of views into a standardized, comparable time series. This produces a cross-sectional panel — one series for each macro variable. Because official macro data is often fragmented or inconsistently reported, and analyst commentary is often dispersed across sources, this framework enables portfolio managers to build coherent cross-sectional datasets that would otherwise be difficult or impossible to assemble. Every data point links back to its underlying excerpts, allowing portfolio managers to quickly investigate the drivers behind shifting views.

In effect, this framework gives macro investors a scalable way to generate custom signals across a wide spectrum of macro impulses — even in areas where traditional data infrastructure is thin, non-standardized, or structurally noisy. The process transforms unstructured documents into precise, directional and forward-looking insights across specific brokers, forming the basis for flexible and impactful alpha-generating applications.

Example: Semantic search finds what keywords would miss

Semantic search enables MLP to find documents that traditional keyword methods would overlook. For example, in a search for 'entity'='Brazil', 'aspect'='GDP', MLP retrieved the following paragraph:

For 2023, we revised our GDP growth forecast slightly from +0.9% to +0.7%. Despite the deterioration only being marginal, the breakdown is less benign for economic activity in the coming years, pushing us to revise our 2023 investment growth forecast from +0.7% to -1.3%. Even with the strong upward revision for the agriculture and livestock sector (from +2.5% to +6.6%) after the release of the second harvest forecast for 2023, along with the fiscal stimuli outlined in the "PEC da Transição" (we expect the expenditure-to-GDP ratio to increase from 18.3% in 2022 to 19.6% in 2023), the deterioration in financial conditions since our last report led us to cut our 2023 GDP growth forecast and revise growth in the industrial sector from +0.5% to -1.3%. For the services sector, tighter financial conditions were offset by the fiscal stimulus, leading us to maintain our growth projection at 1.2%. It is worth noting that the statistical carryovers for GDP growth stand at +3.1% for 2022 and +0.4% for 2023.

Although the paragraph never explicitly mentions "*Brazil*," it includes "*PEC da Transição*," a Brazilian constitutional amendment, making it semantically relevant to the query. The similarity score between the query and this paragraph is 0.7259, indicating a high degree of semantic alignment.

The **verifier module** verifies that this paragraph is talking about the entity (Brazil) and the aspect (GDP). The **sorter module** sorts this paragraph as containing forward looking information. The **classifier** assigns a -1 signal, with the rationale "*The GDP growth forecast for 2023 has been revised down from +0.9% to +0.7%, indicating a decelerating outlook.*"

Measuring market agreement to macro themes

Traditional tools, like using baskets of trades linked to macro themes (e.g., long U.S. equities, short U.S. rates, and long USD to infer expectations for U.S. reflation), remain helpful in gauging the market's collective sentiment. Text-based analysis, however, provides an additional and often more nuanced perspective.

Over the past decade, our work in natural language processing research has demonstrated the value of examining thousands of documents across broker research, financial news, central bank speeches, and other sources to understand the narratives shaping markets. Earlier techniques, such as "bag of words" models and basic embedding models, captured only limited nuance.

With large language models, we can extract meaning at a much deeper level. Our **Market Agreement to Themes (MATT)** framework uses AI to quantify market consensus on thematic investment views. MATT starts by breaking down proprietary thematic views into groups of correlated directional hypotheses, mirroring how we think about market drivers. We then employ proprietary LLMs to analyze broker-report language tied to each hypothesis, helping us assess the level of support or disagreement expressed across the market.

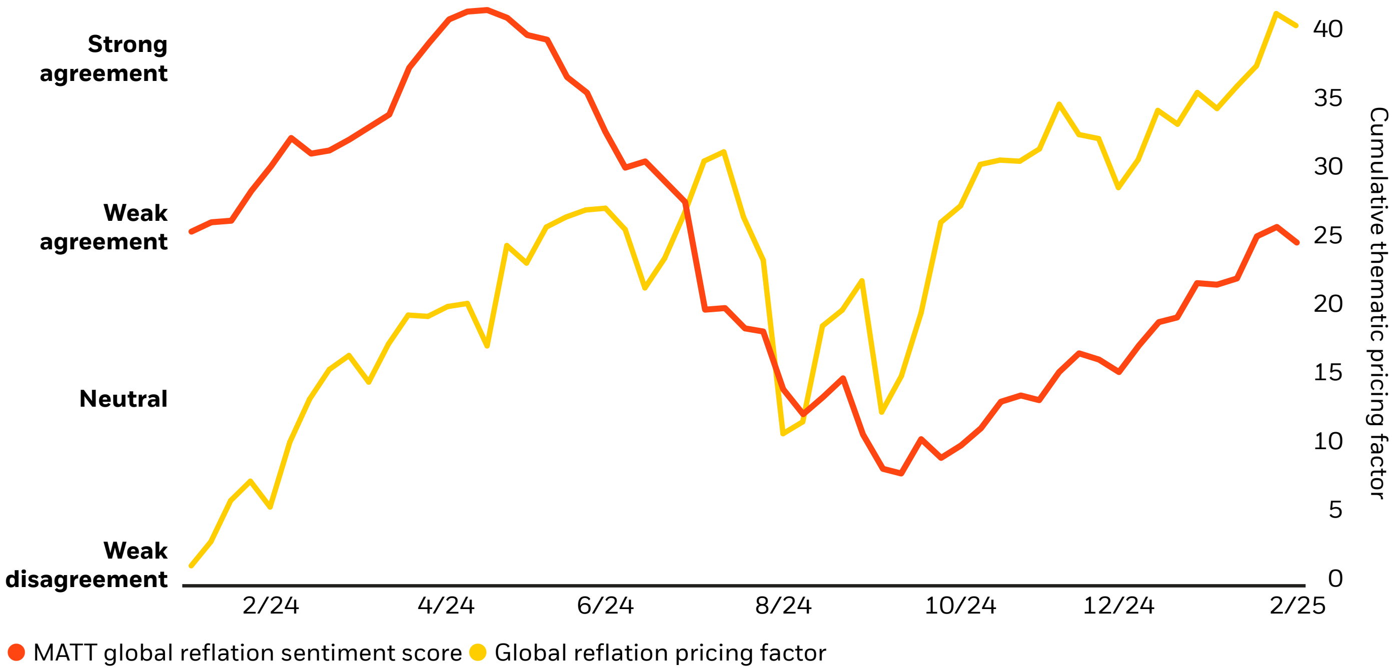
For each relevant segment, we generate a structured hypothesis with these components:

- The matched sentence
- The related hypothesis
- A brief explanation of the connection
- Whether the sentence agrees or disagrees with the hypothesis
- Its relevance to the hypothesis
- Whether the context is forward-looking

Sample output for an analysis broker report agreement to "Global Reflation" theme

Broker report text	Hypothesis	Main theme	Agreement	Hallucination probability
Real urban wages have been steadily declining...	Resilient labor market in key economies	Global reflation	Strong disagree (-2)	0.0%
Generally optimistic that the incoming administration...	Ongoing fiscal stimulus in the U.S.	Global reflation	Strong agree (2)	0.0%
The private sector business cycle has lost momentum...	Resilient labor market in key economies	Global reflation	Weak disagree (-1)	0.0%
Job openings surprisingly gained 259k in November...	Resilient labor market in key economies	Global reflation	Weak agree (1)	2.86%

Figure 1: Sample comparison of MATT-generated sentiment score to market pricing factor
MATT global reflation agreement signal from broker reports



Source: BlackRock, data as of December 2025. Process shown for illustrative purposes only. There is no guarantee a positive investment outcome will be achieved.

We aggregate agreement and disagreement from these tables across themes, dates, brokers, or other dimensions to build time-series scores for each theme. Processing hundreds of relevant observations per day allows us to build a comprehensive and timely measure of market sentiment.

At the simplest level, MATT generates sentiment scores for all tracked themes — those we have traded historically, those currently active, and those being monitored for potential future impact. By comparing these time-series scores with market pricing factors, we can assess what may already be "priced in" and where discrepancies may signal opportunity. This combined approach deepens our understanding of market dynamics.

Because MATT is built on a corpus-level LLM chatbot, we can also interact directly with the underlying documents. This lets us "converse" with the data to explore why certain market beliefs shift and how market views evolve, providing deeper insight into where consensus aligns or diverges from our own research.

In short, MATT offers us a structured way to test our macro views, assists in determining when to express them in trades, and effectively "debate" with the market about what's priced in and what may be overlooked.

Extracting investor views with AI

A third example of how we use LLMs is to systematically harness BlackRock's internal investor expertise by using LLMs on meeting summaries.

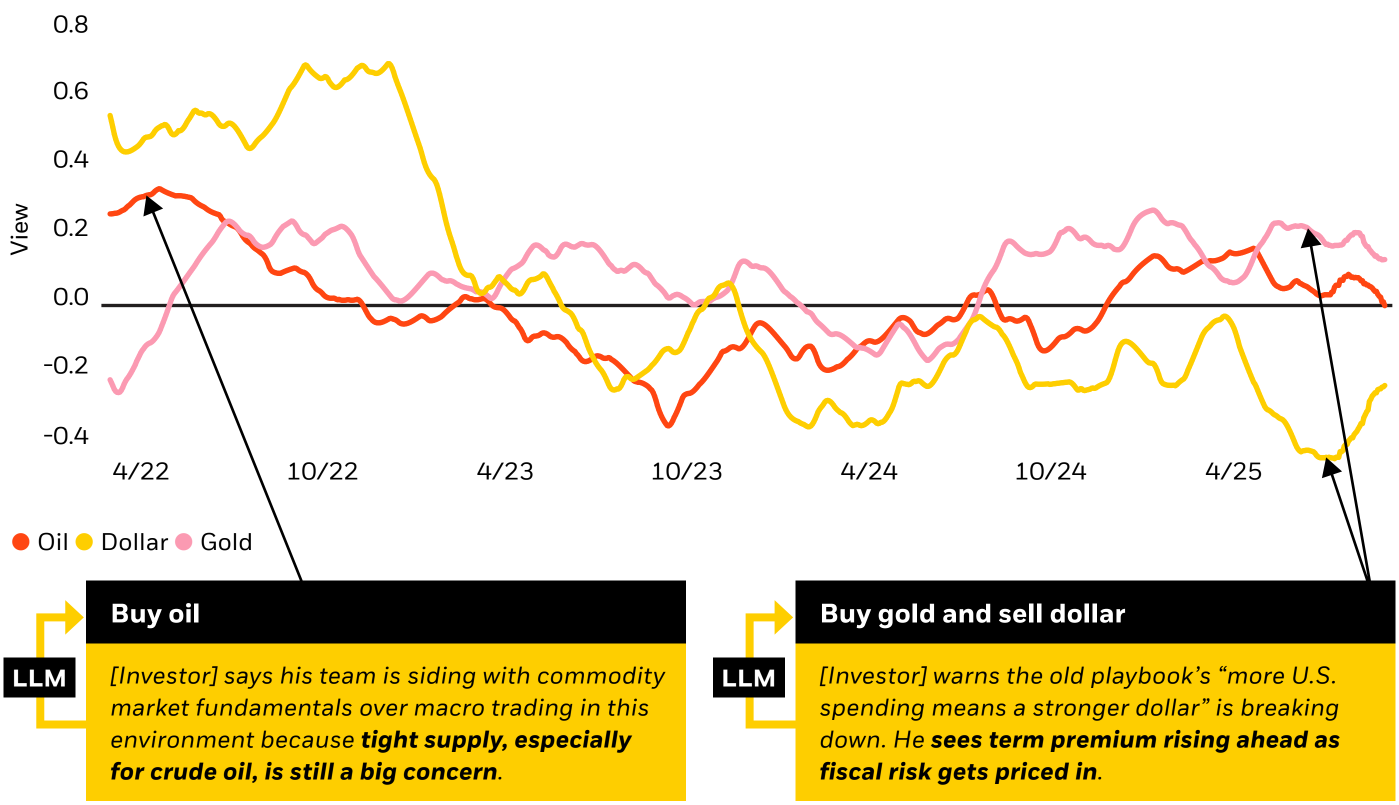
Four times a week, the BlackRock Investment Institute convenes global investors across BlackRock to discuss the macro environment and forward-looking portfolio views. Topics can range from labor markets to regional company fundamentals to broad perspectives on asset classes and risk. These discussions, summarized and archived, contain rich information about investor conviction.

We leverage LLMs to convert these unstructured narratives into actionable macro trades across rates, FX, commodities and regional equities. The extraction pipeline is explicitly designed to mitigate known LLM biases. For example, LLMs are known to exhibit position bias, a tendency to prefer options that appear earlier in a prompt (Zheng et al 2023).[3] To work around this, we randomize the ordering of asset options with each query. We also run the extraction process several times per meeting and average the outputs, reducing the impact of the random ordering and inherent LLM stochasticity.

The mixture of speakers and breadth of topics act as a natural crowdsourcing mechanism, where multiple trade recommendations with varying rationales inform the view on each asset at any moment in time. Figure 2 gives some examples: In early 2022, tight energy supply led to a long oil trade recommendation, while in mid-2025, rising U.S. fiscal risk prompted long gold and short dollar positions. These trades are combined into a composite signal traded systematically across more than 30 asset futures.

This dynamic signal demonstrates how LLMs can transform unstructured qualitative investor dialogue into scalable, systematic alpha.

Figure 2: Investor views (relative to history)



Source: BlackRock, data as of December 2025. Figure 2 is illustrative of investor views sourced from a firmwide investor call, where buy is mapped to 1 and sell to -1, and views are normalized relative to history. Extraction is carried out via LLMs. Produced via collaboration between BlackRock Systematic and BlackRock Investment Institute.

3 Zheng, L., Chiang, W.-L., Sheng, Y., Zhuang, S., Wu, Z., Zhuang, Y., Lin, Z., Li, Z., Li, D., Xing, E. P., Zhang, H., Gonzalez, J. E., & Stoica, I. 2023. "Judging LLM-as-a-Judge with MT-Bench and Chatbot Arena." *Advances in Neural Information Processing Systems 36.* arXiv:2306.05685.

Conclusion

Integrating large language models into macro investing is now practical, repeatable, and deeply additive. Across all three applications, LLMs help us extract structure from unstructured data, reveal forward-looking insights that were previously inaccessible, and translate broad narratives into quantifiable signals that sharpen our understanding of macro dynamics.

Our Macro Language Processing framework helps uncover underappreciated analyst views that would be difficult to identify through traditional data pipelines. Market Agreement to Themes provides a structured way to interrogate market narratives and identify where consensus aligns — or diverges — from our own research. Our internal-wisdom signal converts qualitative investor discussions into systematic, tradable macro exposures.

These tools extend, rather than replace, the intuition and experience of discretionary and systematic macro investors. They help us see shifting consensus early, identify mispricings and express views with greater precision.

As technology evolves, so will the opportunities. With a robust infrastructure and rigorous validation frameworks, we believe LLMs will become foundational to macro alpha generation. The examples here represent early chapters in a much longer story and underscore our conviction that the fusion of advanced language models and macro research delivers a durable competitive edge.

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