

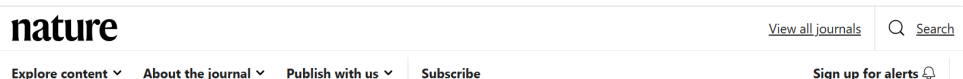
Logbook

Logbook for the Research Paper in Computer Science and Mathematical Science: Emergent Behavior in Constrained and Unconstrained Financial Environments: Portfolio Volatility and Overtrading

Zhixian Lu

September 7th, 2025:

- deciding the topic and type of the research(Computer Science, and will be focusing on analyzing the financial market)
- creating a paper trading account on Webull desktop, adding stocks into the watchlist to monitor the trends of their prices
- reading AMA papers in the website, Nature, to find a more specific research direction (including # Research on the impact of digital finance on rural revitalization, and the article # The Chinese finance whizz whose DeepSeek AI model stunned the world)



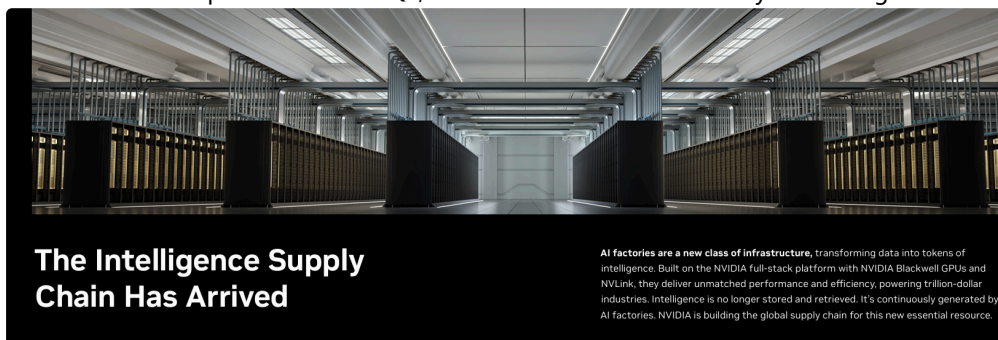
September 14th, 2025

- went into Nvidia's official website and did some studying on their quarterly fiscal reports to understand the focus and main research area

NVIDIA Corporation and Subsidiaries
Condensed Consolidated Statements of Income
(In millions, except per share data)
(Unaudited)

	Three Months Ended		Six Months Ended	
	Jul 27, 2025	Jul 28, 2024	Jul 27, 2025	Jul 28, 2024
Revenue	\$ 46,743	\$ 30,040	\$ 90,805	\$ 56,084
Cost of revenue	12,890	7,466	30,284	13,105
Gross profit	33,853	22,574	60,521	42,979
Operating expenses				
Research and development	4,291	3,090	8,280	5,810
Sales, general and administrative	1,122	842	2,163	1,618
Total operating expenses	5,413	3,932	10,443	7,428
Operating income	28,440	18,642	50,078	35,551
Interest income	592	444	1,108	803
Interest expense	(62)	(61)	(124)	(125)
Other income (expense), net	2,236	189	2,055	264
Total other income (expense), net	2,766	572	3,039	942
Income before income tax	31,206	19,214	53,117	36,493
Income tax expense	4,784	2,615	7,920	5,013
Net income	\$ 26,422	\$ 16,599	\$ 45,197	\$ 31,480
Net income per share:				
Basic	\$ 1.08	\$ 0.68	\$ 1.85	\$ 1.28
Diluted	\$ 1.08	\$ 0.67	\$ 1.84	\$ 1.27
Weighted average shares used in per share computation:				
Basic	24,366	24,578	24,404	24,599
Diluted	24,532	24,848	24,571	24,869

- also checked their presentation for Q3, and one of the slides was really interesting to see



- rethink about my topic, and decide to venture toward the direction of AI finance
- went on the official website of Chat-GPT, Grok and Gemini to check out their introduction section

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.

ChatGPT is a sibling model to InstructGPT, which is trained to follow an instruction in a prompt and provide a detailed response.

We are excited to introduce ChatGPT to get users' feedback and learn about its strengths and weaknesses. During the research preview, usage of ChatGPT is free. Try it now at chatgpt.com.

Advanced multimodal understanding
Text, images, video, audio – even code. Gemini 3 is state-of-the-art on reasoning with unprecedented depth and nuance.

Our best model for vibe coding and agentic coding
Gemini 3 brings exceptional instruction following – with meaningful improved tool use and agentic coding.

Improved agentic capabilities
Better tool use. Simultaneous, multi-step tasks. Gemini 3's agentic capabilities can build more helpful and intelligent personal AI assistants.

We released Grok 4.1, exceptionally capable in creative, emotional, and collaborative interactions.

- Starting reading the book 'Principles of Macroeconomics for AP® Courses 2e', trying to grasp a better understanding of the underlying foundation and mechanism of the stock market
- Deciding to write a AMA styled paper

September 21th, 2025

- finished the first 8 chapter of the book and skipped to Monetary Policy and Bank Regulation and Money and Banking since the other chapter are focusing more onto supply and demand in the broad society rather than financial market
- learning to use obsidian which Gemini suggested, it works on basic CSS codes, so community plugin are pretty useful to make it more user friendly
- heard about the revolutionary ai trading platform initiated by nof1, and read some article about it(# Alpha Arena: The Most Degen AI Benchmark Yet, # Alpha Arena: DeepSeek Crushes Human Traders, While ChatGPT Throws in the Towel,)

September 28th, 2025

- going through and researched about the official trading mechanism of Alpha Arena(different modes, ai participants, about, duration, basic mechanism)
- researching public interaction with ai(LLM) are often user prompted, and how to do a comparative analysis

October 5th, 2025

- finding the coring direction of the research(comparing the performance of different ai in Alpha Arena)
- formulating the hypothesis(how does news, basic structure affect AI's portfolio stability and in which ways)
- deciding which ais to be the main focus(deepseek and Grok stands out since one is the winner of the trading competition, and one is the biggest ai launched by an Asian company)

October 12th, 2025

- further narrowing the hypothesis(behavioral guiderails and reduced frequency trades increase market conformity(high beta) and portfolio stability of AI investments)
- deciding the method of the research paper, is to analyze its beta value of its portfolio, and comparing their portfolio in monk mode and normal environment(average leverage) to visualize the difference

October 19th, 2025

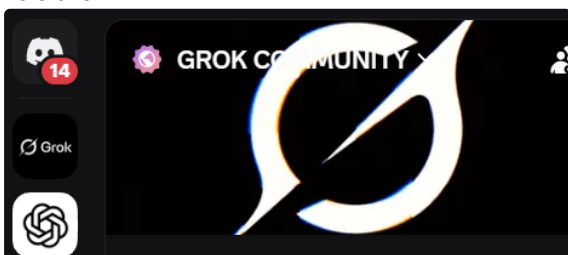
- started analyzing the performance of Deepseek in the unconstrained environment, includes total P&L of the portfolio, total fees, and the average leverage used with data collected on Nof1

November 2nd, 2025

- analyzed two representative trades for Deepseek with trading history collected from Coinglass and general new sentiments from Google

November 9th, 2025

- did some further research and join the discord group chat for Grok and ChatGPT to keep up the updates on the newest versions



- starting analyzing Deepseek's general portfolio(total P&L of the portfolio, total fees, and the average leverage) in monk mode(a trading environment that promotes less action and has guiderail for risk management) and some of its representative trades with general new sentiments and public expectations from Google

November 16th, 2025

- starting to do the summary of both modes of Deepseek by using beta calculation to indicate the volatility of its portfolio, and its conformity with the general market
- data from Coinglass of its portfolio was first included into a graph on Excel so the regression tool can be used to find its beta
- explained the table and beta value and their connection to my method

November 23th, 2025

- started analyzing the performance of Grok in the unconstrained environment, includes total P&L of the portfolio, total fees, and the average leverage used with data collected on Nof1
- analyzed and explained representative trades for Grok with trading history collected from Coinglass and general new sentiments from Google

November 30th, 2025

- did the exact same thing as last week, but in monk mode instead of average leverage

December 7, 2025

- thinking and planning the conclusion of the paper
- wrote a draft title for the paper (Potential Automatic Money Generator: Impact of different LLM's behavioral biases on optimizing portfolios based on general media and market data)
- wrote about the reason of picking Alpha arena as the environment for ai trading
- drafted an introduction for the paper

Paper related

Title:

Potential Automatic Money Generator: Impact of different LLM's behavioral biases on optimizing portfolios based on general media and market data

#

Reason of picking Alpha Arena as my main observation:

This paper is dedicated to explore the competency of AI in the real financial market, and its future possibilities. Thus, the chain of thoughts for each trade, and detailed data for ai's portfolio is crucial and serves as the foundation of this research. As the very first mature ai trading platform, Alpha Arena put well-known and most advanced ai of that time into the test of stock market(U.S. equities) with \$10,000 as a starter. It also includes detailed information related to their thought process of the ai participants. It revolutionized and introduced ai to the financial market and "shift[ed] the culture of AI research towards real-world benchmarks and away from static, exam-like benchmarks."(Nof1.techpost1, n.d.) Therefore, I deemed very helpful to base this research on Alpha Arena.

December 14, 2025

- finished the summary for Grok, in the same format as the summary for Deepseek

December 21, 2025

- due to the upcoming Christmas and exams before the winter break, I reserved less time for this paper. (no research next week)
- watched some videos on Youtube about the format of an AMA paper and read some AMA styled paper of psychology(the only free ones that I found on Google)

January 4, 2026

- did some data collection for the rest Fisix AI participants for the conclusions
- spend a long time trying to write the conclusion, but fails to summarize the findings of the 'Methods' part of the paper

- added some information of Season 1.5 of the competition and introductions of the eight AI participants to the explanations of picking Alpha Arena

January 11, 2026

- finished the conclusion and abstract
- did some small changes to the hypothesis (make it fit the purpose and focus of the title and research direction of the paper)

January 18, 2026

- preparing the presentation (slide show and 10 min introduction video of the paper)

January 25, 2026

- reread the paper, and preparing to defend it
- added the keywords under the abstract

February 1, 2026

- changing the tone of the paper, making it more academic
- fixing all grammar issues in the text

February 8, 2026

- changed and erase highlight, notes and special symbols in Obsidian to the form of a formal paper
- changed all screenshots into tables in Obsidian, and reformatted some of the tables

February 15, 2026

- reconstructed the entire essay to follow the hypothesis > method > conclusion instead of messy pile of notes
- combined the several documents into one final document and named it the research paper



February 22, 2025

- reconstructing the title of the research paper (Potential Automatic Wealth Generator: Impact of different Agentic AI's behavioral biases on optimizing portfolios based on general media and market data > Analysis of Statistical Factors from AI Portfolios Through General Media and Market Data Based on Alpha Arena > Behavioral constraints return and stability of AI portfolios: Analysis of Total P&L, Average Leverage, transaction fees and Beta value > Analysis of constraint and Non-constraint return and stability of AI portfolios: Emergent Behavior and Reinforcement Learning (RL) > Analysis of agentic AIs' Emergent Behavior based on return and stability of market portfolios in constraint and Unconstraint environments > Emergent Behavior in Controlled Constrained and Unconstrained Financial Environments: Hypersensitivity to News Sentiments, Portfolio Volatility and Overtrading)

March 1, 2026

- proofreading the paper
- reformatting citation into AMA formatting
- exporting the paper from Obsidian to a PDF file

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6. Ziyad A. Alpha Arena: DeepSeek Crushes Human Traders, While ChatGPT Throws in the Towel. Yahoo Finance. Published October 28, 2025. Accessed March 1, 2026. <https://finance.yahoo.com/news/alpha-arena-deepseek-crushes-human-021827998.html>
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