



# AI IN INVESTMENT MANAGEMENT

CBONDS CONFERENCE 2024

Robert Hahm



Why AI?



# INFORMATION GAIN

Extract information from data to gain a **competitive edge**

- faster
- process more information



# WHAT TO DO WITH THE INFORMATION?

**trading** - predicting markets

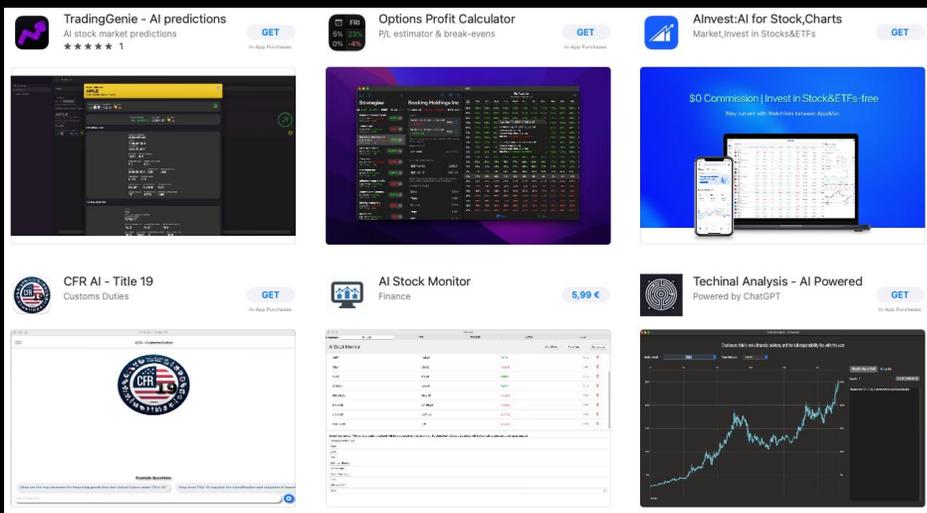
**investment research** - better  
and faster insights

# PREDICTING MARKETS



# PREDICTING MARKETS

aspired by many but accomplished by few



VS

 Renaissance

- 30+ years track record and experience
- Petabyte-scale data warehouse
- Team of PhDs and specialists across mathematics, statistics, computer science, physics, signal processing, code breaker, speech recognition...

'get your AI market prediction for US\$5.99'

# Medallion Fund

## Compared vs. S&P 500

\$100 INVESTED 1988-2018

Medallion Fund  
Net Returns

**\$2.1M**  
+2,103,217%



+2,103,217 %



Source: Gregory Zuckerman's *The Man Who Solved the Market*



# INVESTMENTS

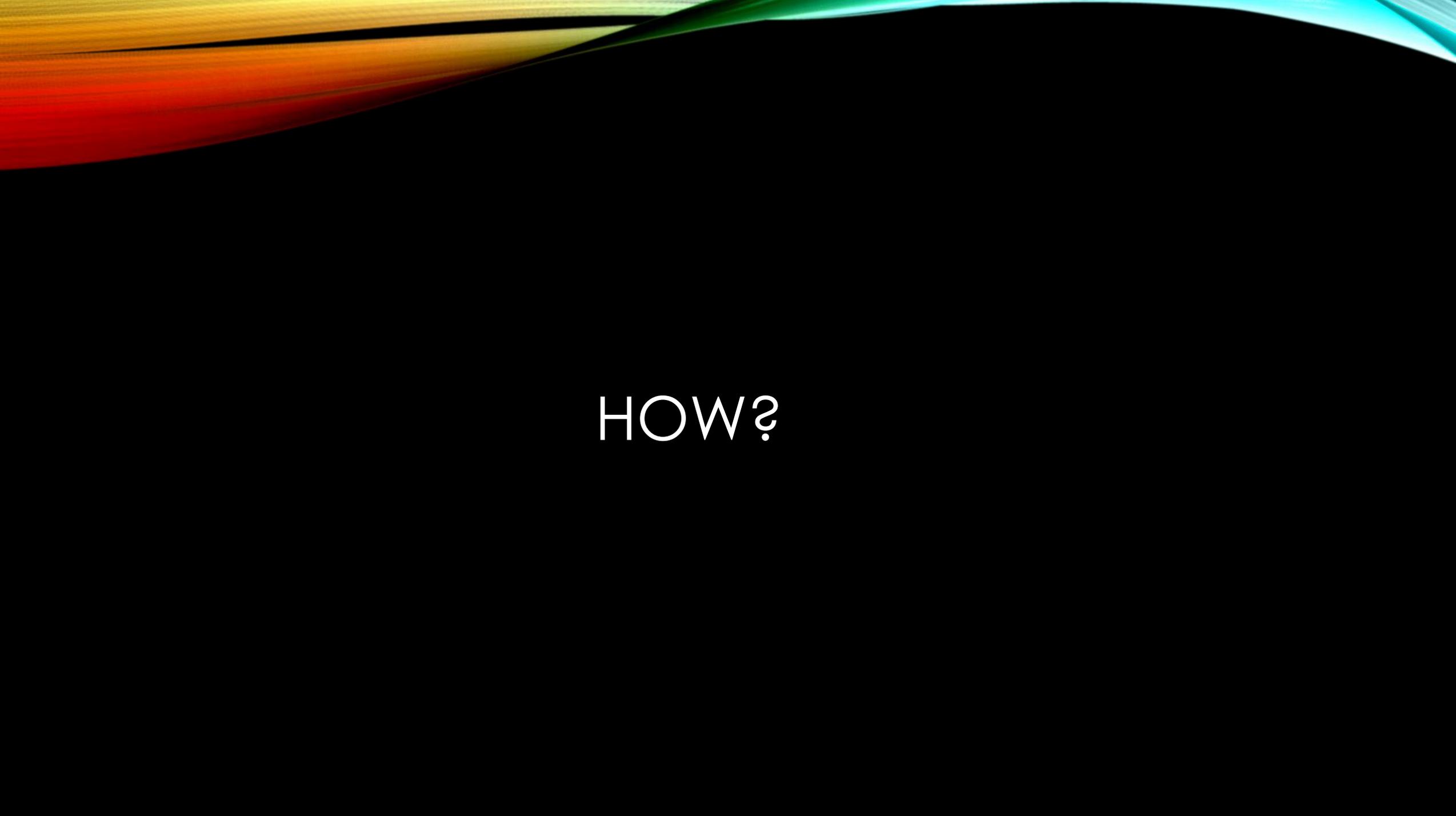
**Operational efficiency** in the research process

# INVESTMENTS

Imagine it is the start of a new week...Monday lunchtime

...and you are done with all of your week's work

...and the work of your colleague



HOW?

# A TYPICAL RESEARCH REPORT...

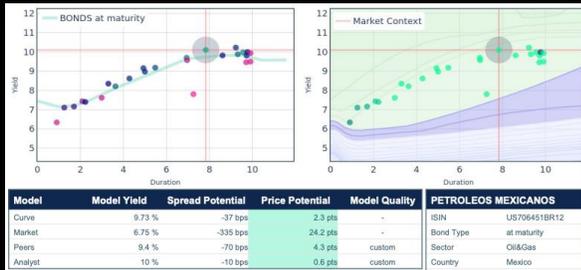


# ...LET'S CHOP IT UP!



# ...CHUNKS OF INDIVIDUAL TASKS...

PETROLEOS MEXICANOS	
ISIN	US706451BR12
Bond Type	at maturity
Sector	Oil&Gas
Country	Mexico
CURE	No
S&P/Moody's/Fitch	BBB / B3 / B+
Outlook	stable / -pos / stable
Model Rating	BB-
Duration	7.83 yrs
Yield	10.105 %
ZSpread	674 bps
Price Bid/Ask	73.4375 / 74.4375
Sukuk	No



### Credit Positives

- PEMEX is Mexico's largest company and ranks among the world's largest vertically integrated petroleum enterprises, providing a significant market position.
- The company has a foreign currency issuer credit rating of BBB, indicating a relatively stable credit profile compared to peers.
- PEMEX's revenue generation is substantial, with reported revenue of approximately \$101.7 billion, showcasing its operational scale.
- The company has a strong EBITDA margin of 27.3%, reflecting its ability to generate earnings before interest, taxes, depreciation, and amortization.
- PEMEX benefits from government support, which is crucial for ensuring adequate liquidity and debt service payments.

### Credit Negatives

- Stressed liquidity due to negative free cash flow (FCF) and high levels of debt, leading to a low cash position and reduced credit availability.
- Significant environmental, social, and governance (ESG) concerns, including high greenhouse gas emissions, operational fires, and employee safety issues, negatively impacting its credit profile.
- High debt burden with a projected cash shortfall of USD 30 billion between 2024 and 2027, complicating financial stability and capital investment.
- Underinvestment in critical infrastructure and maintenance due to high debt service obligations and reliance on government support for negative cash flows.
- Poor operational track record highlighted by multiple incidents resulting in injuries and fatalities, raising concerns about management effectiveness and regulatory compliance.

### Executive Summary

PEMEX, Mexico's largest company and a major player in the global petroleum sector, presents a mixed investment outlook. The company boasts a foreign currency issuer credit rating of BBB, reflecting a relatively stable credit profile. With reported revenues of approximately \$101.7 billion and a strong EBITDA margin of 27.3%, PEMEX demonstrates significant operational scale and profitability. Additionally, government support is a critical factor, ensuring liquidity and facilitating debt service payments.

However, PEMEX faces substantial challenges, including stressed liquidity due to negative free cash flow and a high debt burden, projected to result in a cash shortfall of USD 30 billion from 2024 to 2027. The company has also underinvested in critical infrastructure, which could hinder future growth. Furthermore, significant environmental, social, and governance (ESG) concerns, including high greenhouse gas emissions and safety issues, negatively impact its credit profile.

The current credit outlook for PEMEX is negative, with expectations of further deterioration unless structural reforms are implemented. The reliance on government support is crucial; any changes in this relationship could adversely affect credit quality. While potential upgrades could arise from improved operational performance and governance, the looming debt maturities and weak liquidity position present significant risks.

In summary, while PEMEX has a strong market position and government backing, its high debt levels, liquidity issues, and ESG concerns make it a risky investment at this time.



Model	Yield	Spread	Price	Quality
Curve	9.73 %	-37 bps	2.3 pts	-
Market	6.75 %	-335 bps	24.2 pts	-
Peers	9.4 %	-70 bps	4.3 pts	custom
Analyst	10 %	-10 bps	0.6 pts	custom

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Key Metrics	2022	2023	Change	Change	2023
Total assets	2,245,558	2,303,475	2.6%	57,917	136,123
Current assets	527,895	538,541	2.0%	10,646	31,825
Non-current assets	1,717,663	1,764,935	2.8%	47,271	104,298
Total liabilities	4,014,380	3,956,454	-1.4%	(57,926)	233,805
Current liabilities	929,737	1,123,718	20.9%	193,980	66,406
Short-term financial debt	465,948	477,222	2.4%	11,274	28,201
Long-term liabilities	3,084,643	2,832,736	-8.2%	(251,907)	167,400
Long-term financial debt	1,825,516	1,317,249	-19.0%	(308,268)	77,842
Total equity	(1,768,822)	(1,652,979)	6.5%	115,843	(97,682)
Total liabilities and equity	2,245,558	2,303,475	2.6%	57,917	136,123

### Further Considerations

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The overall picture indicates a mixed trend. While the reduction in total liabilities and long-term debt is encouraging, the significant rise in current liabilities could offset these gains if not managed effectively. The negative equity position remains a critical concern for bondholders, as it reflects the issuer's ongoing struggles to generate sufficient profits to cover its obligations.

For bondholders conducting periodic reviews of creditworthiness, the key metrics to monitor going forward include the trends in current liabilities and short-term financial debt, as these will provide insights into the issuer's liquidity position. Additionally, tracking the company's operational performance, particularly in terms of revenue generation and cost management, will be essential to assess whether the improvements in equity can be sustained.

In conclusion, while PETROLEOS MEXICANOS has made notable progress in reducing its long-term liabilities, the sharp increase in current liabilities and the persistent negative equity position warrant caution. The issuer's ability to navigate these challenges will be critical in determining its future creditworthiness and the risk profile for bondholders.

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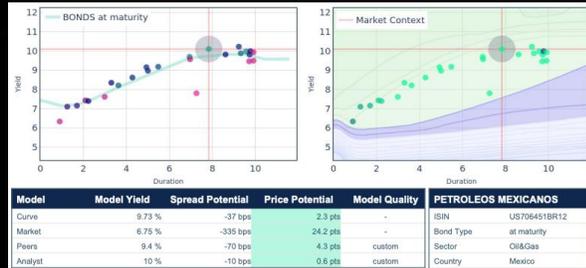
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ZSpread	874 bps
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Total liabilities	4,014,380	3,956,654	-1.4%	(57,726)	233,925
Current liabilities	929,737	1,123,718	20.3%	193,980	66,428
Short-term financial debt	485,548	477,222	-2.4%	(11,274)	29,201
Long-term financial debt	3,084,843	2,832,736	-8.2%	(251,907)	197,720
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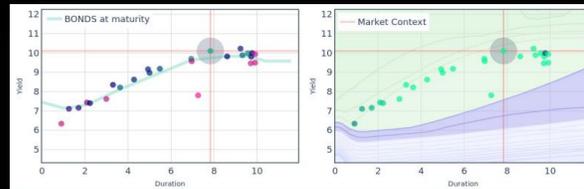
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# smart algorithms, and machine learning models

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Short-term financial debt	463,948	477,222	2.4%	11,274	28,201
Long-term liabilities	3,084,643	2,832,736	-8.2%	(251,907)	167,400
Long-term financial debt	1,625,516	1,317,249	-19.0%	(308,266)	77,842
Total equity	(1,768,802)	(1,652,979)	6.5%	115,843	(97,682)
Total liabilities and equity	2,245,558	2,303,476	2.6%	57,917	136,123

classic automation with data feeds and pre-defined calculations



Model	Model Yield	Spread Potential	Price Potential	Model Quality	PETROLEOS MEXICANOS
Curve	9.72 %	-37 bps	2.3 pts	-	ISIN US706451BR12
Market	6.75 %	-335 bps	24.2 pts	-	Bond Type at maturity
Peers	9.4 %	-70 bps	4.3 pts	custom	Sector Oil&Gas
Analyst	10 %	-10 bps	0.6 pts	custom	Country Mexico



ISIN	Country	Duration	Yield	Rating	Type	Sukuk	Sector	ISIN
PEMEX 6 625 100601010	Mexico	6.9 yrs	8.7 %	BB-	at maturity	No	Oil&Gas	US706451BR12
PEMEX 6 625 100601010	Mexico	7.0 yrs	9.57 %	BB-	at maturity	No	Oil&Gas	US706451BR12
PEMEX 6 625 100601010	Mexico	7.2 yrs	7.91 %	BB-	at maturity	No	Oil&Gas	US706451BR12
PEMEX 6 625 100601010	Mexico	7.8 yrs	10.11 %	BB-	at maturity	No	Oil&Gas	US706451BR12
PEMEX 6 625 100601010	Mexico	8.0 yrs	9.42 %	BB-	at maturity	No	Oil&Gas	US706451BR12

**Executive Summary**  
 PEMEX, Mexico's largest company and a major player in the global petroleum sector, presents a mixed investment outlook. The company boasts a foreign currency issuer credit rating of BBB, reflecting a relatively stable credit profile. With reported revenues of approximately \$101.7 billion and a strong EBITDA margin of 27.3%, PEMEX demonstrates significant operational scale and profitability. Additionally, government support is a critical factor, ensuring liquidity and facilitating debt service payments. However, PEMEX faces substantial challenges, including stressed liquidity due to negative free cash flow and a high debt burden, projected to result in a cash shortfall of USD 30 billion from 2024 to 2027. The company has also underinvested in critical infrastructure, which could hinder future growth. Furthermore, significant environmental, social, and governance (ESG) concerns, including high greenhouse gas emissions and safety issues, negatively impact its credit profile. The current credit outlook for PEMEX is negative, with expectations of further deterioration unless structural reforms are implemented. The reliance on government support is crucial; any changes in this relationship could adversely affect credit quality. While potential upgrades could arise from improved operational performance and governance, the looming debt maturities and weak liquidity position present significant risks. In summary, while PEMEX has a strong market position and government backing, its high debt levels, liquidity issues, and ESG concerns make it a risky investment at this time.

**Credit Positives**  
 - PEMEX is Mexico's largest company and ranks among the world's largest vertically integrated petroleum enterprises, providing a significant market position.  
 - The company has a foreign currency issuer credit rating of BBB, indicating a relatively stable credit profile compared to peers.  
 - PEMEX's revenue generation is substantial, with reported revenue of approximately \$101.7 billion, showcasing its operational scale.  
 - The company has a strong EBITDA margin of 27.3%, reflecting its ability to generate earnings before interest, taxes, depreciation, and amortization.  
 - PEMEX benefits from government support, which is crucial for ensuring adequate liquidity and debt service payments.

**Credit Negatives**  
 - Stressed liquidity due to negative free cash flow (FCF) and high levels of debt, leading to a low cash position and reduced credit availability.  
 - Significant environmental, social, and governance (ESG) concerns, including high greenhouse gas emissions, operational fires, and employee safety issues, negatively impacting its credit profile.  
 - High debt burden with a projected cash shortfall of USD 30 billion between 2024 and 2027, complicating financial stability and capital investment.  
 - Underinvestment in critical infrastructure and maintenance due to high debt service obligations and reliance on government support for negative cash flows.  
 - Poor operational track record highlighted by multiple incidents resulting in injuries and fatalities, raising concerns about management effectiveness and regulatory compliance.

**Further Considerations**  
 \*\*\* Please double check credit metrics! Some or all ratios appear to be inconsistent with the issuer. \*\*\* The provided credit metrics for PETROLEOS MEXICANOS, a government-related entity in the Oil & Gas sector, reveal a complex financial landscape that warrants careful analysis. In examining the total assets, there has been a modest increase of 2.6% from 2022 to 2023, reflecting a growth in both current and non-current assets. Current assets rose by 2.0%, while non-current assets saw a slightly higher increase of 2.8%. This suggests a stable asset base, which is crucial for operational liquidity and long-term investment capacity. However, the total liabilities have decreased by 1.4%, indicating a positive trend in debt management. Notably, long-term liabilities have decreased significantly by 8.2%, and long-term financial debt has seen a dramatic reduction of 19.0%. This reduction in long-term obligations is a positive sign for the issuer's financial health, as it may indicate improved cash flow management and a focus on reducing leverage. Conversely, current liabilities have surged by 20.9%, which raises concerns about short-term liquidity. The increase in current liabilities, particularly in the context of rising short-term financial debt, could pose challenges if the company faces unexpected cash flow pressures. The total equity remains negative, although it has improved by 6.5% from the previous year, suggesting that while the company is still in a deficit position, it is making strides towards recovery. The overall picture indicates a mixed trend. While the reduction in total liabilities and long-term debt is encouraging, the significant rise in current liabilities could offset these gains if not managed effectively. The negative equity position remains a critical concern for bondholders, as it reflects the issuer's ongoing struggles to generate sufficient profits to cover its obligations. For bondholders conducting periodic reviews of creditworthiness, the key metrics to monitor going forward include the trends in current liabilities and short-term financial debt, as these will provide insights into the issuer's liquidity position. Additionally, tracking the company's operational performance, particularly in terms of revenue generation and cost management, will be essential to assess whether the improvements in equity can be sustained. In conclusion, while PETROLEOS MEXICANOS has made notable progress in reducing its long-term liabilities, the sharp increase in current liabilities and the persistent negative equity position warrant caution. The issuer's ability to navigate these challenges will be critical in determining its future creditworthiness and the risk profile for bondholders.

large language models, retrieval augmented generation (RAG), prompt automation

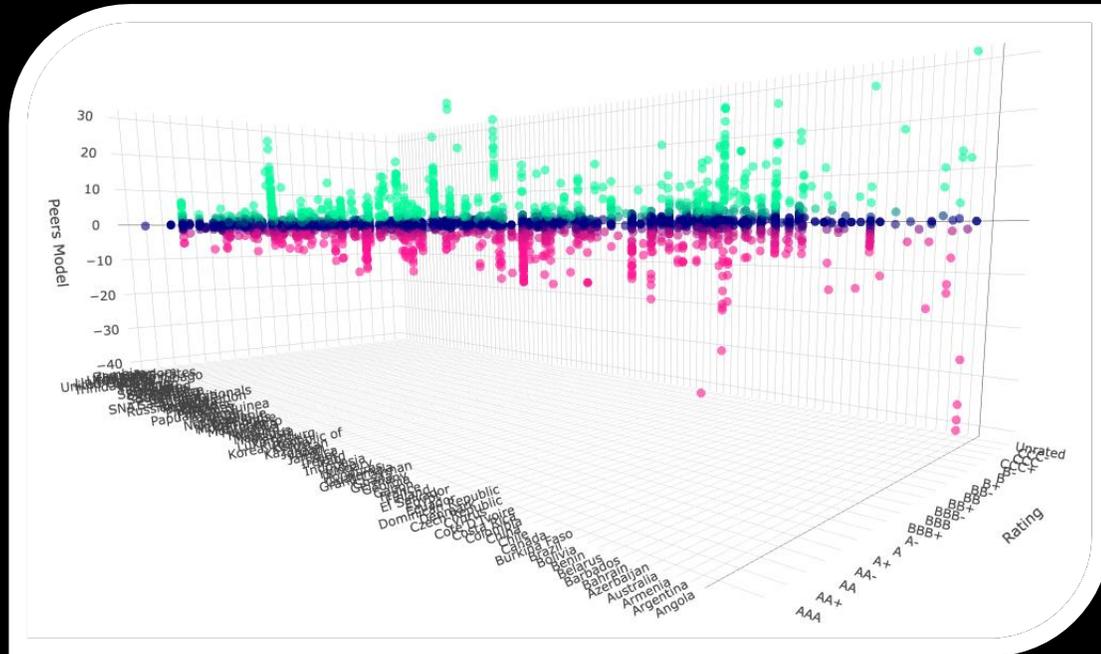
# WHERE IS THE **HUMAN** IN THIS?

**Professional knowledge and experience!**

- **INPUT: selection of information sources**  
-> 'garbage in, garbage out'
- **OUTPUT: sanity check and editing**  
-> 'hallucinations' and mix-up of information

**This is where you spend  
99% of your time.**

# WHAT IS THE RESULT?



**a lot faster:** get a day's work done in less than an hour

**a lot more data:** processing of vast data beyond your normal scope



# WHAT ARE YOUR BENEFITS?

**ad hoc insights**

**wider research coverage**

**spot opportunities first**

**better quality and consistency**



WHAT IS THE FUTURE?

# LOOKING FORWARD AGENTIC AI



plan investment process, gather information, make decisions, iterate, review, learn, draw conclusions

## AI Automation Tools and Workflow

Gathering information  
Formatting information  
Screening 100s of documents and sources for relevant information  
Pulling statistical data for quantitative analysis  
Interpreting text and numbers to gain insights  
Formulating opinion  
Summarizing  
Writing proposal  
Adding supporting charts and statistics  
Polish layout  
Publish

# LOOKING FORWARD AGENTIC AI AT SCALE



# TAKEAWAY

**Low hanging fruits:** efficiency and quality

**Accelerating technology:** frontier for automation moves exponentially.

**Fierce competition:** anyone not adopting AI technologies is falling behind.

**...see you on Monday!**