MTFC Project Proposal 2025-26

Team Name	Better Call Us All
Team ID #	23913
Short Title for Proposal	Risks associated with hedge funds
Topic Category	Finance/Business

MTFC Project Proposal Template Use Notes:

- *Note that the topic for the Project Proposal is the **team's choice** (i.e., it is **NOT** intended that you use the 2025-26 Scenario Quest corn farming for your project proposal topic)*
- *Refer to the official MTFC Project Proposal Prompts 2025-26 for the 15 prompts and scoring instructions.*
- *The use of this template is OPTIONAL.*
    - *It is provided as an optional resource for teams to keep their Project Proposal response organized. Teams who wish to use this template should make a copy in order to edit.*
- *The final version of the team's MTFC Project Proposal should be downloaded as a PDF or Word document to submit on the ICS Dashboard. A single file will be submitted.*
- *Additional resources (including the Actuarial Process Guide) can be found on the Modeling the Future Challenge website: https://www.mtfchallenge.org/resources/*
- *Please direct any questions to challenge@mtfchallenge.org.*

Part 1: Project Definition *(Team's Topic)*

These prompts can be found on page 3 of the MTFC Project Proposal Prompts 2025-26. Additional information on Project Definition can be found in ***Step 1: Project Definition*** in the Actuarial Process Guide.

Team Responses:

#1: Identify the topic

- Response: Risks associated with Hedge Funds

#2: Identify potential risks

- Response:
    - Loss of money due to market volatility
    - Market Risk
    - Liquidity
    - Law Making
    - Suicide
    - Humiliation
    - Credit
    - Debt

#3: Identify a behavior change risk mitigation strategy

- Response:
    - A behavioral change strategy could involve portfolio diversification across asset classes, geographic regions, and sectors to mitigate the impact of market volatility. Furthermore, hedge fund managers can adopt more specific portfolio balancing routines and set up stop-loss thresholds to avoid the overexposure of a single market event.

#4: Identify a modifying outcomes risk mitigation strategy

- Response:
    - Some modifying outcomes include options, futures, and swaps to hedge against potential losses from unfavorable price movements in the owned assets.

#5: Identify an insurance risk mitigation strategy

- Response:
    - There can also be portfolio insurance that can be set up through options or dynamic hedging to protect investors against market disturbances. Another strategy could be that hedge funds can use a tail-risk hedging fund to insure against extreme loss.

#6: Identify driving research questions for your topic

- Response:
    - What is a good distribution of investments to avoid complete failure due to any one investment?
    - What kind of market properties could be used to accurately train a machine learning model to generate market signals for the future?
    - How do new tools evolve the use of hedge funds?
    - What risks associated with large-scale investments are most easily avoidable, and why?

Part 2: Data Identification & Assessment *(Team's Topic)*

These prompts can be found on page 4 of the MTFC Project Proposal Prompts 2025-26. Additional information on Data Identification and Assessment can be found in ***Step 2: Data Identification & Assessment*** in the Actuarial Process Guide.

Team Responses:

#7: Identifying the type of data you hope to find

- Response: We hope to find/create a model that is able to distribute finances or accurately generate market signals based on current or historical market data.

#8: Identify potential data sources for your topic

- Response:
  Potential data sources for the topic include existing GitHub repositories, existing market strategies, and historical market data.

  https://finance.yahoo.com/quote/BTC-USD/history/

  https://finance.yahoo.com/quote/ETH-USD/history/

  https://finance.yahoo.com/quote/CAD-USD/history/

  The Yahoo Finance site is a credible source of information. Not only is Yahoo a global company, but the BTC and ETH blockchains are publicly available (All data is publicly verifiable). These are all data sources that indicate historical frequencies. While losses may be easily inferred from this data, they do not inherently present data about past losses.

  The team would be able to visualize this data with a candlestick plot and apply technical indicators to look at potential patterns. Additionally, the team could run the raw data through a machine learning model in order to catch patterns that cannot be noticed via manual observation.

#9: Modeling research on your topic

https://arxiv.org/html/2410.06935v1

This paper shows an XGBoost classification model that was able to predict historical Bitcoin data accurately. It shows that using machine learning is a viable route to go when creating a mathematical model designed to mitigate risk in the stock market. It also gives direction and shows what we could begin to investigate when we begin creating the model. The concept of the XGBoost model and the Classification models are foreign, but they are easily learned and understood.

Part 3: Mathematical Modeling *(Team's Topic)*

These prompts can be found on page 5 of the MTFC Project Proposal Prompts 2025-26. Additional information on Mathematical Modeling can be found in ***Step 3: Mathematical Modeling*** in the Actuarial Process Guide.

Team Responses:

#9: Modeling research on your topic

The previous experience in this field, as seen in the papers read, generally used machine learning models in order to predict price trends of various stocks via historical data and technical indicators. These are helpful because they enable us to begin thinking about what a potential architecture for the model could be. There is some math that we are unfamiliar with, but it is easily learned and implemented.

https://www.researchgate.net/publication/368417092_Predicting_Bitcoin_Trends_Through_Machine_Learning_Using_Sentiment_Analysis_with_Technical_Indicators

https://arxiv.org/html/2410.06935v1

#10: Goals of a mathematical model in the project phase

Ideally, the model will be able to either create a profitable asset distribution between multiple commodities or accurately predict price trends in stock/crypto markets. Maximizing profit is the definition of minimizing loss due to anything, including market volatility. A model like the ones presented in the papers would help analyze the risk associated with investing money in the stock market. Deep learning analysis and machine learning are good candidates for mathematical analysis strategies that we could implement later on in order to analyze and mitigate risk.

#11: Assumption development

1) Our model ideally will have a variable future time period; however, it depends on the shape of the training data received. The optimal timeframe is 15 minutes to an hour, which allows the algorithm to pick up on miniature details and micro patterns in the order book. Additionally, having a larger timeframe (15m or 1 hour vs 1 minute) is beneficial because it allows a human to use the algorithm to place the trades, which makes sure that the trading process is not fully automated.
2) The data will always be shaped the same, because the format has been standardized for ages. All those who keep a record of the data we will be using have it stored in the same format. The rate of change will likely be different, as the data is influenced primarily by itself and its public opinion (people's opinion about it). Saying that the rate of change is not stable is a rational prediction because saying that the rate of change is stable would be completely irrational.

Part 4: Risk Analysis *(Team's Topic)*

These prompts can be found on page 6 of the MTFC Project Proposal Prompts 2025-26. Additional information on conducting a Risk Analysis can be found in ***Step 4: Risk Analysis*** in the Actuarial Process Guide.

Team Responses:

#12: Goals for mitigation strategy

1) Based on the current trajectory of the environment we are focusing on, people will continue to obtain more and more wealth. However, there will be many people who try to get rich and fail, because their risk mitigation strategies are not strong enough.
2) The goal of our risk mitigation strategy is to reduce the risks of market trading.

Part 5: Recommendations *(Team's Topic)*

These prompts can be found on page 7 of the MTFC Project Proposal Prompts 2025-26. Additional information on making Recommendations can be found in ***Step 5: Recommendations*** in the Actuarial Process Guide.

Team Responses:

#13: Recommendation differences between mitigation strategies

Time consumption, feasibility, and real application opportunities will steer us toward deciding on a threat model to choose. Additionally, we would like to develop a model that we are able to wrap and export for external use and benefit. Real application opportunities are important because our project being applicable to the real world, rather than being purely theoretical, is desired.

#14: Audience for recommendations

The audience that will be making decisions about implementing risk mitigation strategies will be losing money to the risks - these people are hedge fund managers. They will be deciding what strategies and algorithms are implemented by the hedge fund programmers, and are in a position of power in the hedge fund.

#15: Goals for situation improvement

Hopefully, the strategy leads to more profit within the hedge fund. The best-case scenario outcome is to eliminate loss due to market volatility completely, but this is incredibly difficult and would immediately stop working if many people found out about it. Another goal is to keep the portfolio widespread, so that a sudden market movement unanticipated by the model would not lead to the failure of the entire organization.