Market Making on Betfair

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Betting vs. Financial Markets

Bets and Options

Bets involve predicting outcomes with payoff based on accuracy. Options are financial derivatives granting the right to buy or sell assets at a set price before a specific time.

Risk and Reward Dynamics

Both bets and options are speculative with high risk and potential rewards.

Market Movements and Predictions

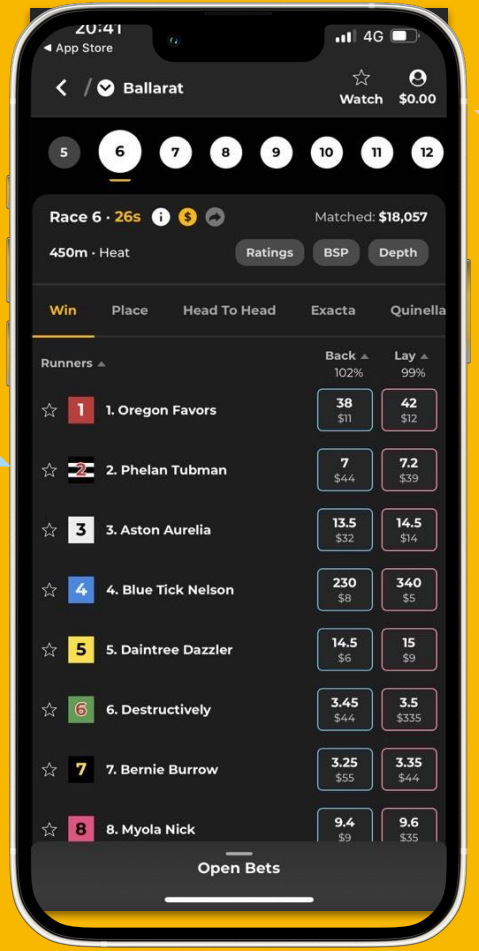
Both involve predicting future events such as sports outcomes or stock price movements. External factors like team performance or market news influence decisions in both domains.

Pricing Mechanisms and Valuation

Betting odds reflect event probabilities, akin to option pricing models estimating option values based on factors like volatility and asset price. Implied volatility and betting odds adjust based on market perceptions of future events.

Introduction to Betfair

- Betfair is an online betting exchange that allows users to bet against each other rather than against a bookmaker.
- Founded in 2000, Betfair revolutionized the betting industry by introducing peer-to-peer betting and market-driven odds.
- It operates as a platform for users to back and lay bets on a wide range of sports, events, and outcomes.



Principles of Market Making on Betfair

1

Constantly offering back and lay prices to maintain liquidity in a market.

2

It is crucial for efficient trading by offering competitive bid-ask spreads to constantly generate positive expected value and minimise risk

3

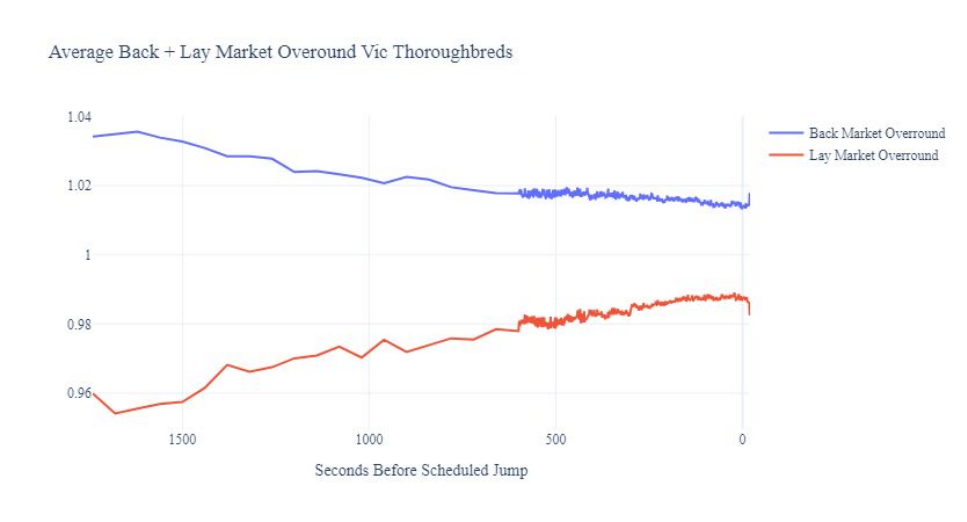
Constantly managing risk exposure, adjusting prices based on market conditions, and optimizing order placement strategies as markets change over time.

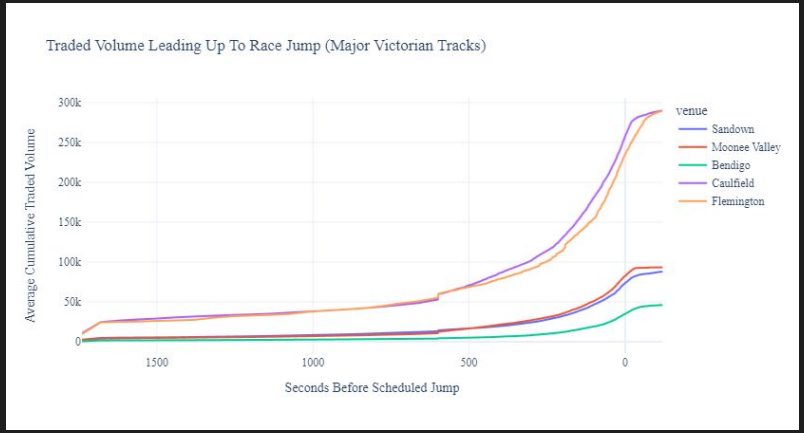
Market Making Strategy Process

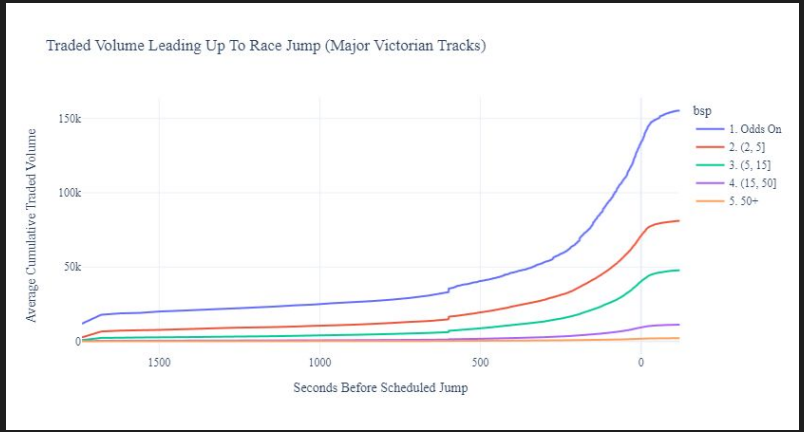
- Research and develop the market making strategy in Python.
- Tailor bet sizing and trading behavior to minimize risk.
- Run model on recent data set and review findings

Betfair Horse Racing Market

*Data for Feb-24 at 5 Major Victorian Tracks







Development - Market Making Model: Spread

Market makers profit from the spread of assets by calculating the optimal spread rate.

The expected mid price is calculated using the best bid and ask prices, along with the probability of an upward movement.

- $Ep = Best\ BP * (1 - Pup) + Best\ LP * Pup$
- $Pup = Best\ Back\ Volume\ /\ (Best\ Back\ Volume + Best\ Lay\ Volume)$

Spread is calculated with standard deviation in mind to avoid extreme mispricing in spreads.

$$S_{T+1} = max(1,\ round(\ e^{-X} * Ast/2 * (1 + \bar{\sigma}))$$

Actual spread is the difference between the best bid and ask volumes, indicating the current spread in the market.

Development - Market Making Model: Liability

- The liability in a market maker model is the potential amount that the bookmaker could win or lose if a specific horse wins the race.
- To calculate the liability, it involves summing the amount wagered on all horses and subtracting the amount that will be paid out on the winning horse.
- If the liability is negative, the strategy would be to back more on that specific horse and lay more on all the other horses to balance the position.
- Conversely, if the liability is positive, the approach would be to lay more on the winning horse and back more on all the other horses to manage risk effectively.

Development - Market Making Model: Risk Management

Trading behaviour to transfer risk, we set limit = 10u

Scenario	MM behaviour
$\text{Liability}_k < 0$	Backing more than laying
$0 < \text{Liability}_k < \text{limit}$	Trade
$\text{Liability}_k > \text{limit}$	Laying more than backing

$$TL_k = \sum_{i=1}^{N} X_i - \sum_{i=1}^{N} Y_i + \mathbf{1_k}\left[\sum_{l=1}^{L}\left(Y_{k,l} * BP_{k,l}\right) - \sum_{j=1}^{J}\left(X_{k,j} * LP_{k,j}\right)\right]$$

- Do not trade for the least favourite horse

Risk management is crucial for identifying, assessing, and prioritizing risks to minimize and control potential impacts on trading.

Development - Market Making Model: Inventory Management

Back more

- If liability is negative increasing back prices will reduce liability in the case the lay loses.
- Reduce lay liability.

$$Back\ price = Ep + S * v \quad (7)$$
$$Lay\ price = Ep - (S + 1) * v \quad (8)$$

Lay more

- We reduce the price of the lay to reduce risk
- Setting the price too low may result in reduced profits for the market maker.
- Mismatched back and lay prices may lead to imbalanced books.

$$Back\ price = Ep + (S + 1) * v \quad (9)$$
$$Lay\ price = Ep - S * v \quad (10)$$

Development - Market Making Model: Order Sizing

For every time ticks, we initialize 1 unit capital to trade

Scenario	Order Size
Top 3 favourite horse (smallest bsp)	25% each → 75% for top 3 horses
Remaining horses	Allocate the remaining 25% with decreasing sequence (least favourite horse gets smallest proportion)

Bettors prefer to bet more on the first three favourite horses

Development - Market Making Model: Backtesting

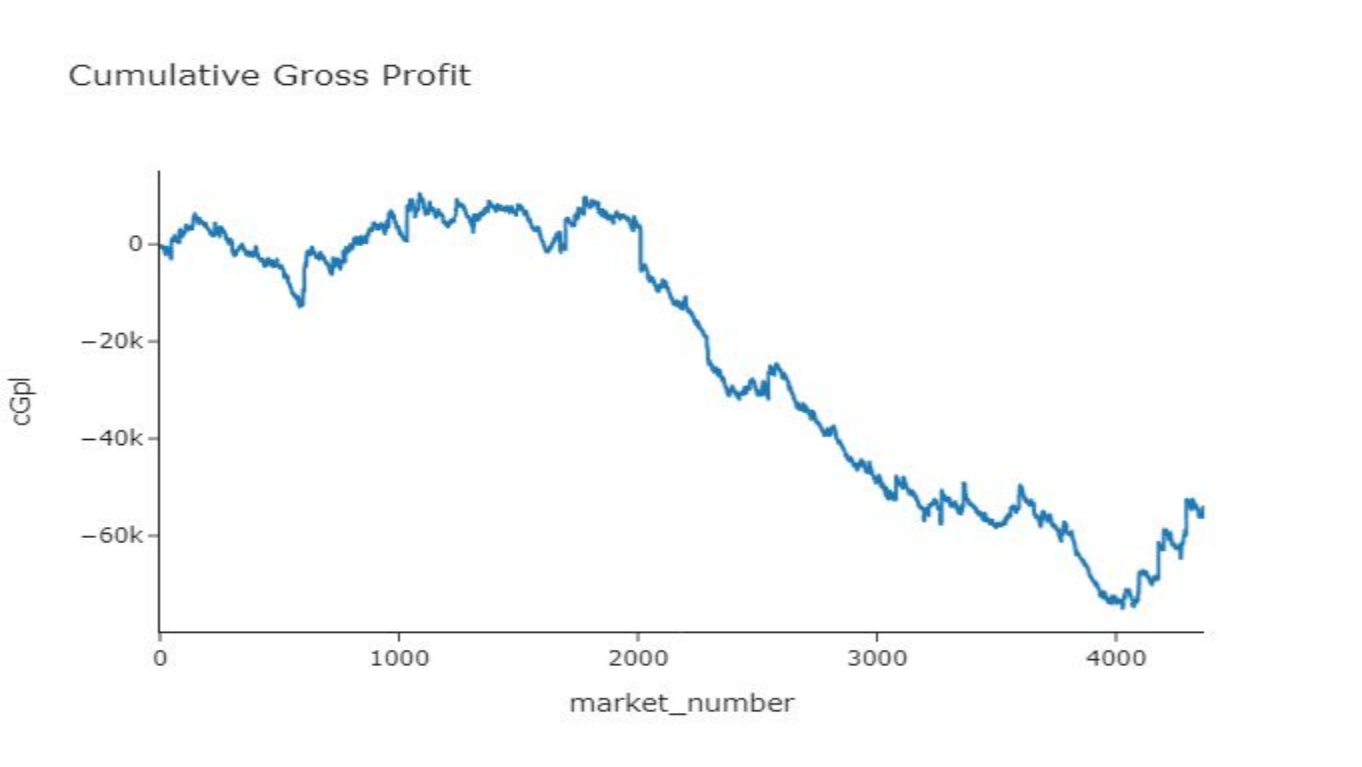
- 3 Months of Betfair's Horse Racing Data (Dec-23, Jan-24, Feb-24)
- 129 racetracks in Australia
- For each race, we gather data from 30 minutes before race starts, splitted to 2 sections

Time before scheduled jump	Interval
30 - 10 minutes	1 minute
10 minutes - start	1 second

- Stream 1 race to the model, calculate expected price, spread, etc. Output logic for each horse in every timestamp, and proceed with the trade.

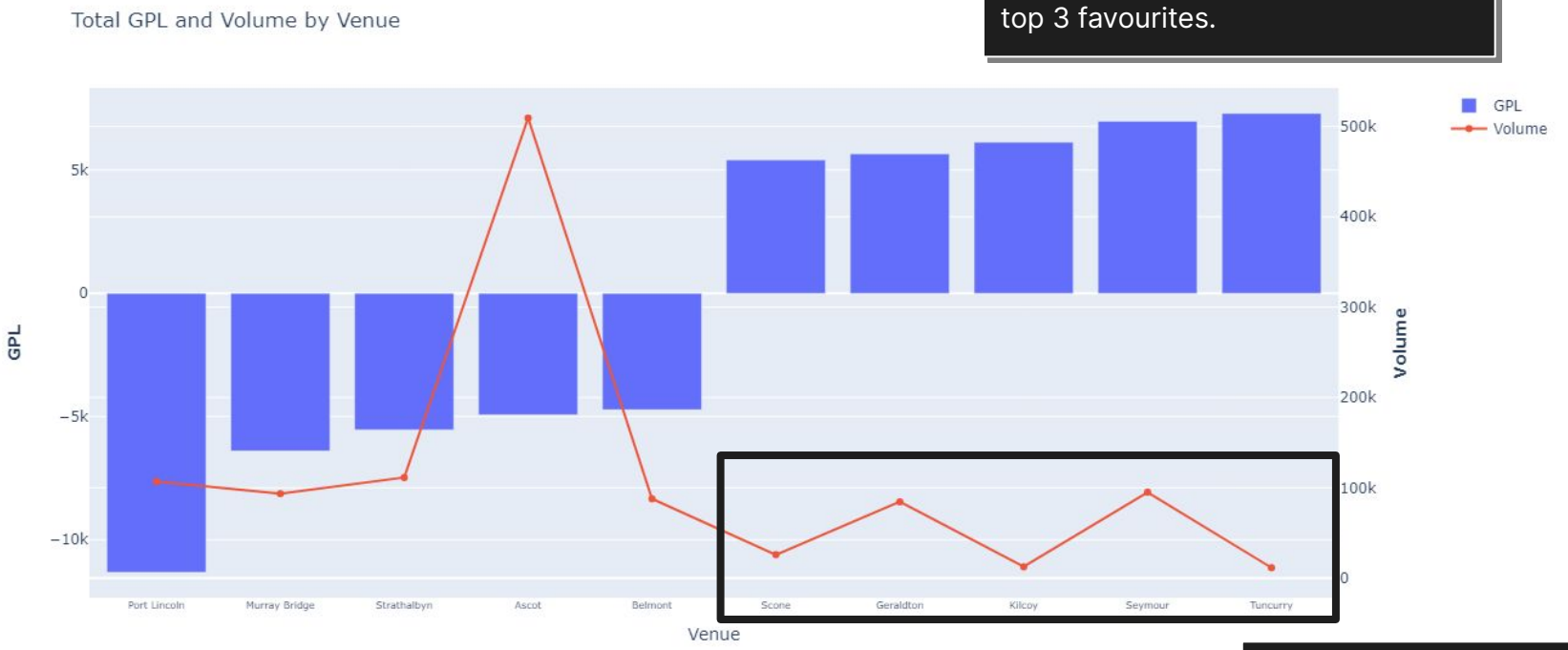
Overall Result for All Tracks

Venues	Gross PnL	Stake	PnL %
All Tracks	-54014.2	2.46*10^6	-2.2%



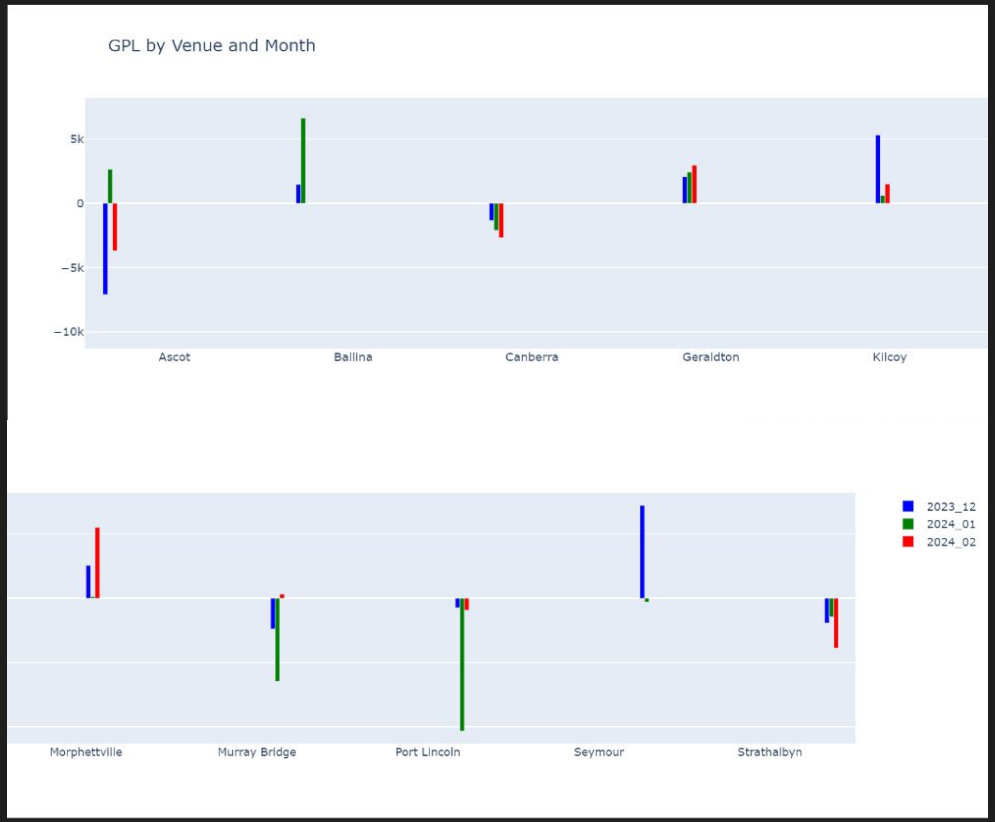
Backtesting - Finding Trends

Our model shows a different approach to backtesting by focusing on specific horse selections rather than the general top 3 favourites.



Shows consistent trend that our model are profitable on tracks with volume < 100k

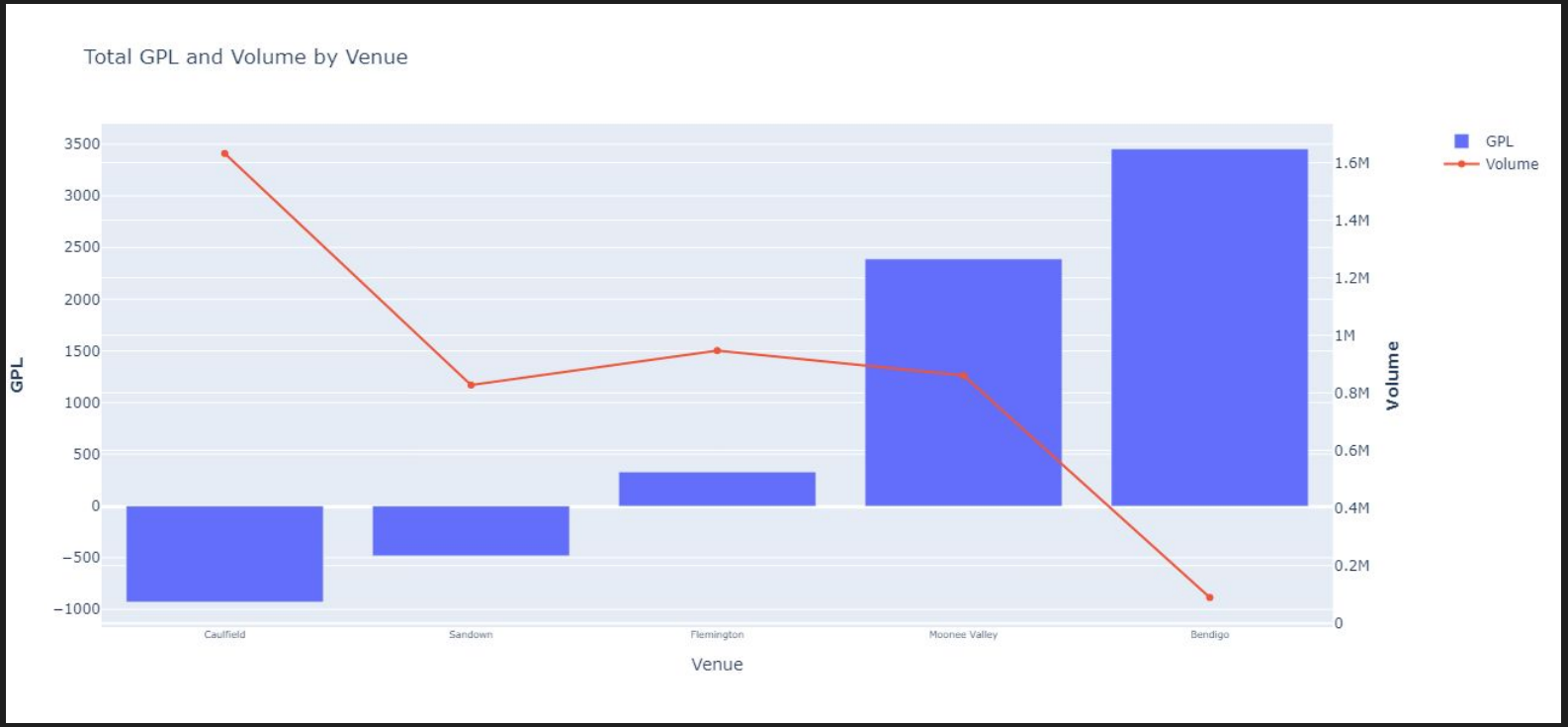
Backtesting - Finding Trends (Winners and Losers)



Key Observations:

- → Some tracks show consistent wins, while others consistently lose.
- → The strategy's effectiveness varies across markets, suggesting market-specific factors.
- → Possibly due to differing levels of trader information and market dynamics.

Backtesting - Finding Trends (Major VIC Tracks)



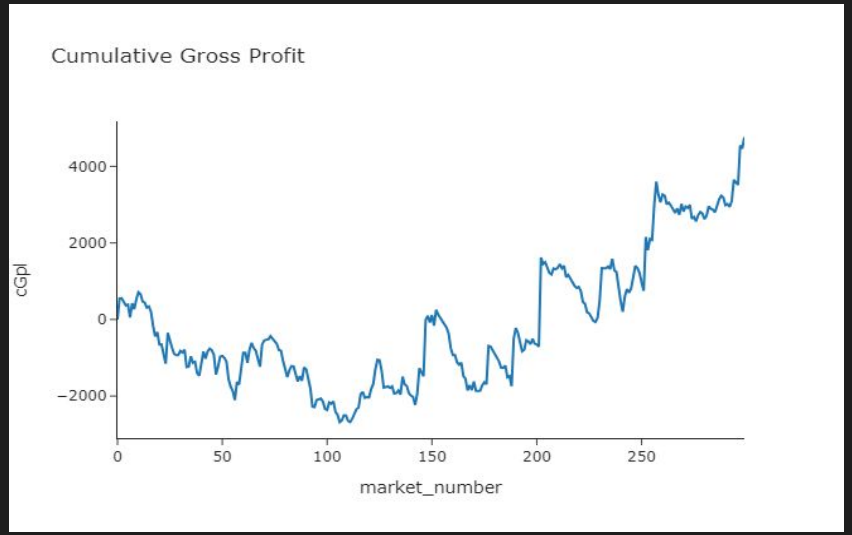
Comparison with Base Model (Major VIC Tracks)

Base Model:

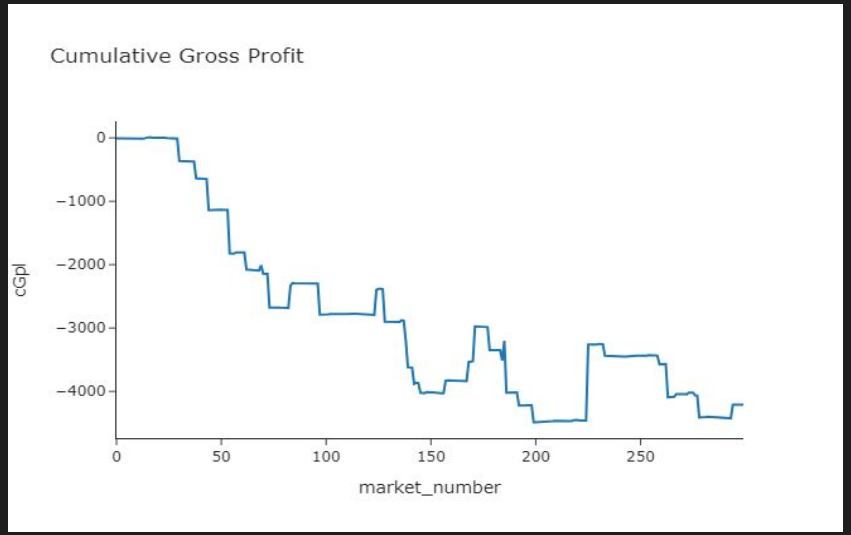
- Back and Lay on ‘bsp’ odds
- Backing top 3 favourite horses, lay the rest
- Order Sizing scenario is the same

Model	Gross PnL	Stake	PnL %
Ours	4761.9	153020.5	3.1 %
Base	-4210.7	20510	-20.5 %

Our Model



Base Model



Risks of Market Making on Betfair

Liquidity Issues

Market illiquidity can lead to difficulties in executing trades efficiently and may result in wider bid-ask spreads, impacting profitability. Additionally, executing large orders in such markets can significantly impact market prices, potentially leading to adverse moves against the market maker's positions.

Market Volatility

Sudden price fluctuations can expose market makers to increased risk, especially during volatile market conditions, affecting pricing strategies. Rapid price movements can lead to the execution of orders at undesirable prices, potentially eroding profits or incurring losses.

Regulatory Considerations

Compliance with regulatory requirements and changes in legislation can impact market making operations on Betfair, requiring constant monitoring and adaptation.

Strategies to Mitigate Risks

Diversify markets and events to reduce exposure to single risks.

Set clear risk limits and use stop-loss mechanisms to control losses.

Monitor market conditions closely and adjust strategies based on real-time data.

Improved price estimation.

Adjust spread with more precision.

Size orders according to market conditions.

Improving Trading Strategy

Future Development Considerations

- Implement more logic to handle different trading situations
- Cross matching on the fly to reduce liability more effectively
- Further backtesting to verify results
- Follow trends closely

Integration of AI and Machine Learning

- Development of automated trading algorithms for efficient market making processes in a live setting
- Enhanced data analytics tools for better decision-making
- Utilize AI and machine learning for advanced market analysis

Q&A Session

Thanks for watching