Historic Leveraged-Carry Trades on the MATIC Network

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Hypothesis

- We believe we can create a strategy that can find the most profitable deposit and lending yields on stablecoins on the MATIC network.
- We are going to look at the AAVE platform, specifically at the stablecoins on the MATIC network. These coins include DAI, USDC, USDT.
- We are going to look at the historical deposit rates over time, to see which stablecoin has the best yield and reward rates on a given date.
- We will look at the performance of allocating our assets into the most profitable stablecoin at a given time, compared to solely investing in DAI, USDC, USDT over the same timeframe.

AAVE

Assets ▼	Market size ▼	Total borrowed ▼	Deposit APY ▼	Variable Borrow APR ▼
Wrapped Matic (WMATIC)	$ 603.36M	$ 276.59M	4.25% 5.55% APR	11.59% 12.10% APR
DAI	$ 1.04B	$ 825.85M	2.83% 3.21% APR	3.96% 4.05% APR
USD Coin (USDC)	$ 1.8B	$ 1.2B	1.78% 1.86% APR	2.96% 2.78% APR
USDT Coin (USDT)	$ 468.26M	$ 421.8M	3.62% 7.15% APR	4.47% 7.93% APR
Wrapped ETH (WETH)	$ 2.35B	$ 840.11M	1.42% 1.43% APR	4.41% 3.98% APR
WBTC Coin (WBTC)	$ 1.41B	$ 658.5M	2.16% 2.38% APR	5.76% 5.08% APR
Aave (AAVE)	$ 197.26M	—	— 16.96% APR	—

Our Motivations

- In the long run, we wanted to develop a strategy to maximize our returns on a leveraged carry trade strategy across all coins. In order to do this, we needed to limit our strategy in the following ways:

- Limiting ourselves to only stablecoins prevents us from having to track the performance of the underlying assets over time.
- Limiting ourselves to one liquidity protocol (AAVE) prevents us from having to track the performance of the reward tokens over time
- Limiting ourselves to the individual investor vs an institutional investor so we don't have to track utilisation rate affecting interest rates and slippage

Questions We Asked

- Looking at each of the stable coins, which coin has the best return rate (without rewards) over time?
  - We wanted to get an idea for which coins gave the best returns without taking the price of MATIC into consideration
- Which coin has the best rewards rate over time?
- When is it appropriate to enter a leveraged vs unleveraged position?
  - We needed to be able to determine when it was appropriate to use our strategy
- What should that position be?
  - We needed to be able to determine what coins we should enter a leveraged position.
- How many rewards will we gain each day? How much will we aggregate over time?
- How much return will we gain each day? How much will we aggregate over time?
- If we were to invest $10,000 into the optimal deposit/return strategy, how much money would we aggregate in a given period?
  - We needed to be able to identify our profitability.

Where we found the data

- We used AAVE's API to pull historical data. This allowed us to look at the historical borrowing and lending rates over time, as well as the historical borrowing and lending rewards over time.
- https://aave-api-v2.aave.com/#/data/get_data_pools

| Date	Symbol	USD	Deposit Rate	Deposit Rewards	Borrow Rate	Borrow Rewards
04-01-2021	USDC	0.9995634311214836464615941823529927	0.01782819168714060316	0.03245735343462328989	0.02967161147898829215	0.04869640232838669612
04-01-2021	DAI	0.9999564074000004727193920342762235	0.03758562322879935825	0.05519308217397210065	0.05199437448488389003	0.06883993988608505116
04-01-2021	USDT	1.0013017563406184448753995527853876	0.06713736943343280338	0.13060848640854065023	0.08224228895467314734	0.14422926872965851956
04-02-2021	USDC	1.0014342012000015960015729478478544	0.01782819168714060316	0.03245559483325482211	0.02967161147898829215	0.04869244389648133079
04-02-2021	DAI	1.0034409978000015992140214423796549	0.03758562322879935825	0.05518677898480548115	0.05199437448488389003	0.06883013461176803122

Data Exploration and Cleanup

- When we were retrieving the data from the API, there was only 1 API endpoint that would return the data we needed, and only for one day. We needed to loop through and repeatedly call the API endpoint.
- Sometimes it would return a 500, so we needed to create a retry loop.
- For the data we retrieved we had to enter it into a dataframe so that we could manipulate it and explore it
- We were able to look at the data for each coin on a given date, as well as returns/rewards on that date.
- Returns and rewards were given as annualized numbers, so we needed to create functions to give us a percentage return on a given day.

Borrow Rewards for each stablecoin

- Since this is the smallest pool, USDT consistently had the highest rewards for borrowing with a peak of around 16% and a bottom of around 8%.
- Each of the other stablecoins had lower rates since they can be used as collateral and are bigger pools.


Borrow Rewards for each Stable coin
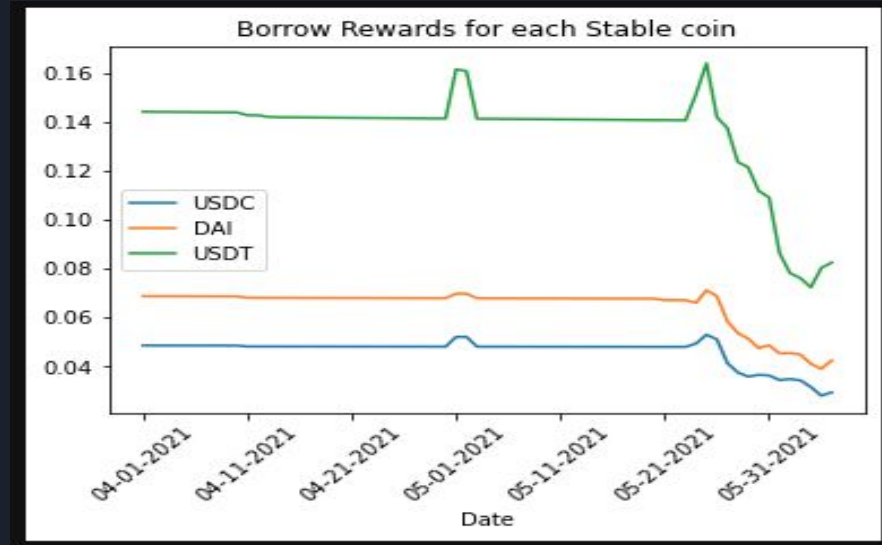
Lending Rewards for each Stablecoin

- The same rules apply for lending which is why USDT had the highest lending rate for the majority of the time
- However, there was a brief period where DAI lead in Rewards earned towards the end of the month of May
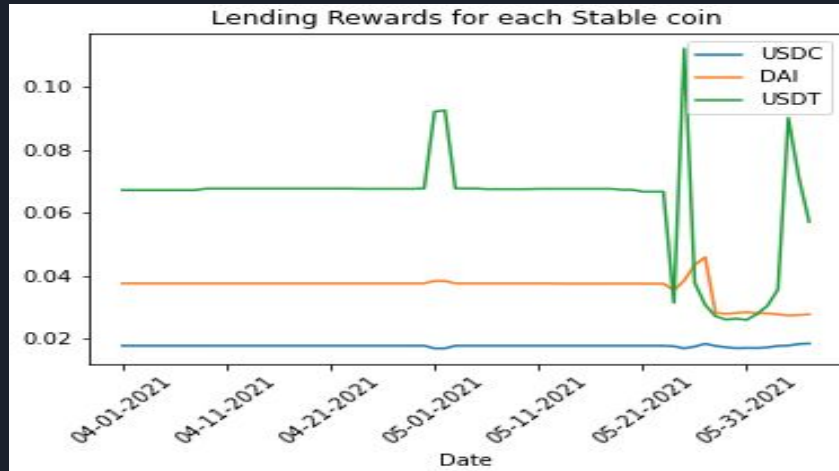
Amount used for lending

- The amount being used for lending and borrowing is permitted because our algorithm was able to find opportunities profitable with leverage until the end of May.
- When there are no opportunities, the algorithm will primarily go to USDT which can't serve as collateral.
- We identified opportunities to leverage based on if there was a borrow rate available that was lower than any of the deposit rates.
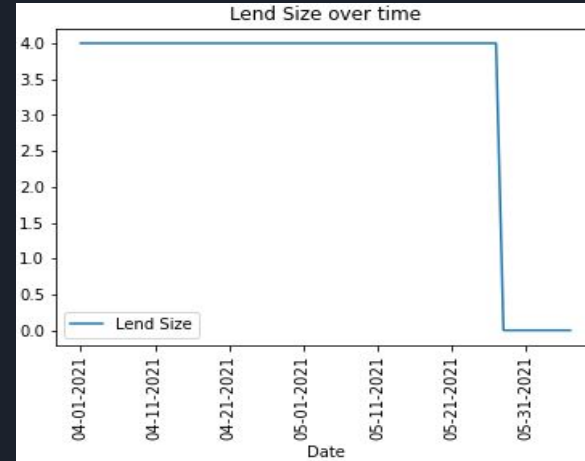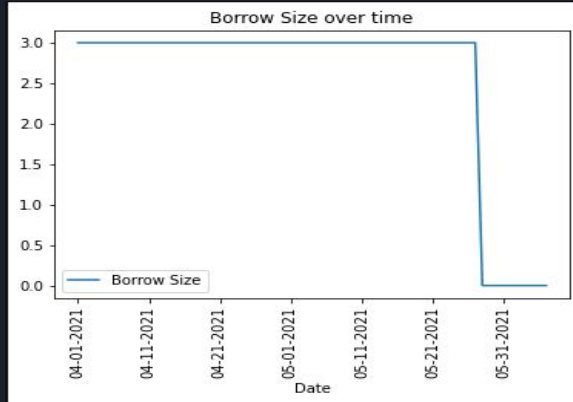
Daily Rewards Gained

- Our daily rewards (not including yields) averaged at about .1% per day until 05-24.
- On that day we switched from a leveraged to an unleveraged strategy, which lowered our rewards but increased our returns for that day
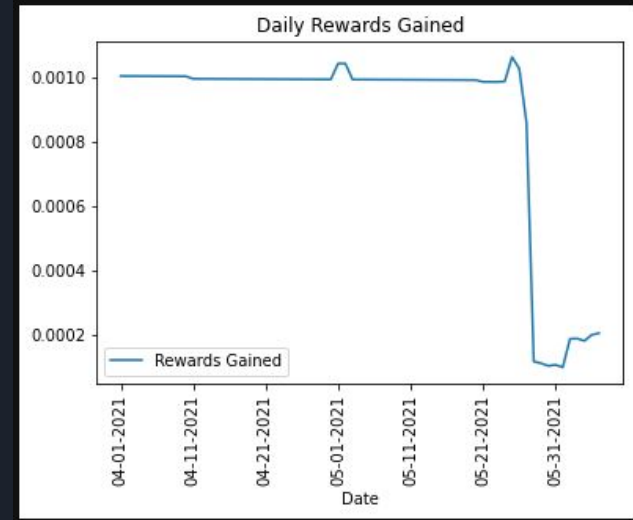
Aggregate Returns over Time

This comparison show the percentage of returns with extended deposits of cash in each stable coin pool along with our algorithm.

Over time this comparison shows that our algorithm is a competitive strategy of arbitrage trading compared to holding a single stable coin over our time period.

Holding USDT shows to offer higher gains in rewards, but overall our algorithm shows to be an outstanding alternative to holding in one pool.
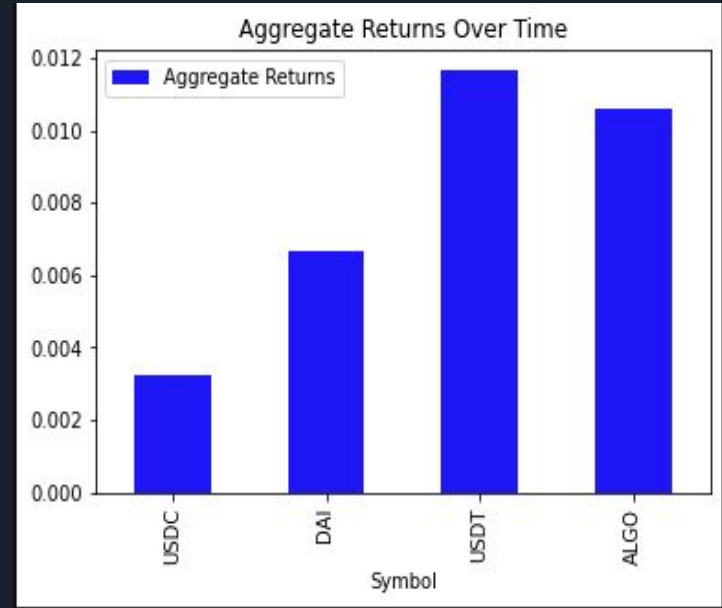
Aggregate Rewards Over Time

- Similar to the Aggregate Returns, this comparison, we are showing the percentage of rewards with extended deposit of capital in each pool of stable coins.
- On the right, we show the rewards gained using our algorithm of arbitrage trading with the highest amount earned for Aggregate Rewards
- This is a collected amount over time and shows how our strategy can be more effective compared to only holding USDT
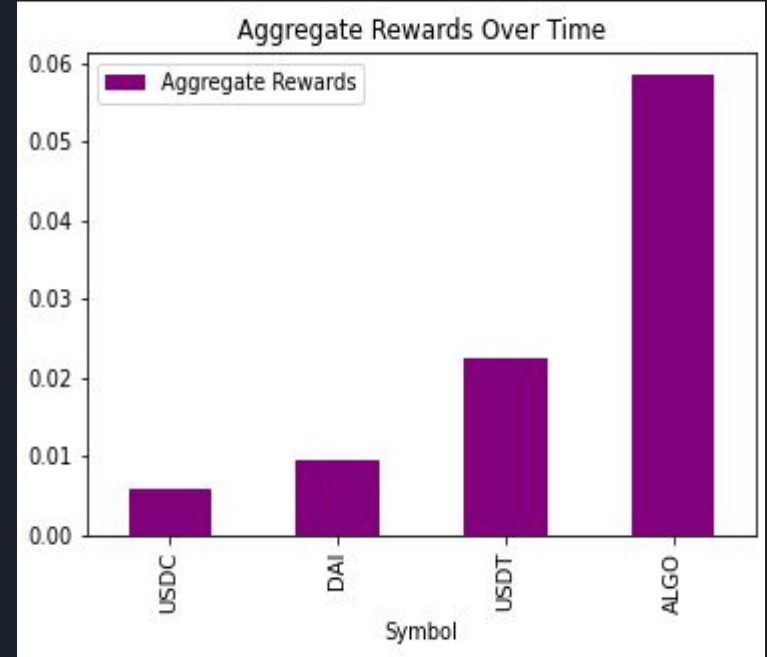
Total Returns Over Time

We show here the total returns gained as a percentage over our time period. Comparatively we show our algorithm close to doublesthe returns available to that of USDT, the leader in returns offered as a single pool.
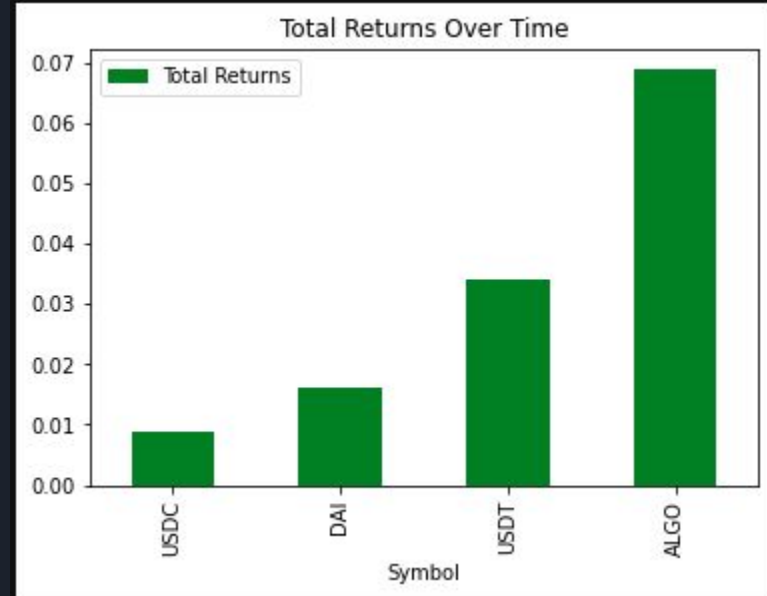
Initial Investment through the time frame used

- An initial investment of $10,000 through the months of April, May, and the beginning of June would give a return of around $695.05 with our strategy going up to the beginning of June.
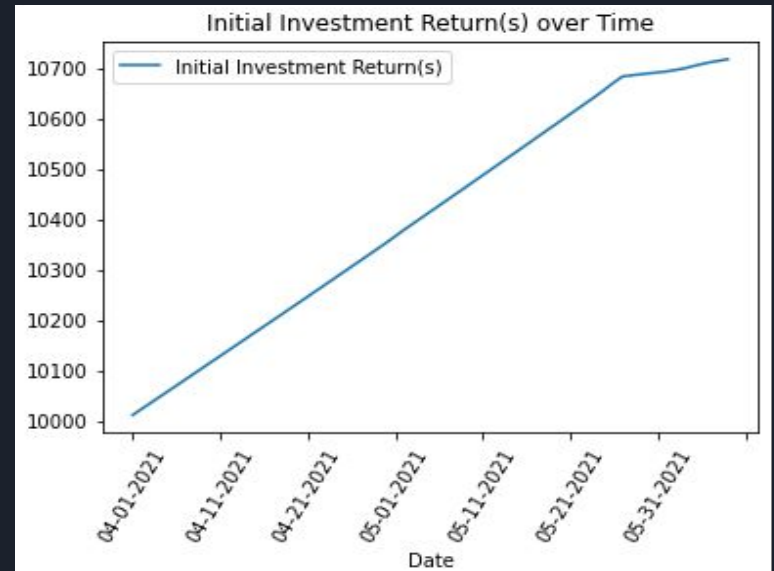
Discussion

- It was odd to see that lending rate and lending rewards for each coin were so correlated with each other.
- It was also surprising to see that a trading strategy between these coins is almost perfectly linear when executing the leveraged strategy, but this makes sense because of the correlation between coins.
- DAI/USDC was the most frequently invested in (we were in a leveraged position more often than not)
- Our Investment Returns graph accurately shows our performance over time, and how it shifts when moving from a leveraged to unleveraged strategy
- Gas prices did not need to be considered because we are trading daily, and costs on the MATIC network for these transactions are approximately 300,000 GAS at 1 GWEI ($.0004)
- It makes sense that our leveraged strategy returned the highest returns as rewards, as each day we are choosing the most profitable coin, leveraging ourselves, as opposed to staying only in one currency and not being leveraged.

Implication and next steps

- Some questions we would want to answer given more time are:
  - How would this change for an institutional investor vs. a retail investor?
    - Size of Positions, (Slippage, fees, shifting market)
  - How would this change by swapping coins with other ones available on other platforms?
    - Collateral usage, differential pricing, arbitrage, speed of trades.
  - How much more profitable could we make this by including other lending platforms?
    - Fees, timing, slippage