
CAPSTONE PROJECT

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PROBLEM STATEMENT

A novice investor is looking to diversify his investment portfolio after making satisfactory gains in the stock market. He has narrowed down his options to Gold & Cryptocurrency (ETH) and is looking for some insights on which investment option would most likely yield a larger return after a 5 year investment horizon.



OR



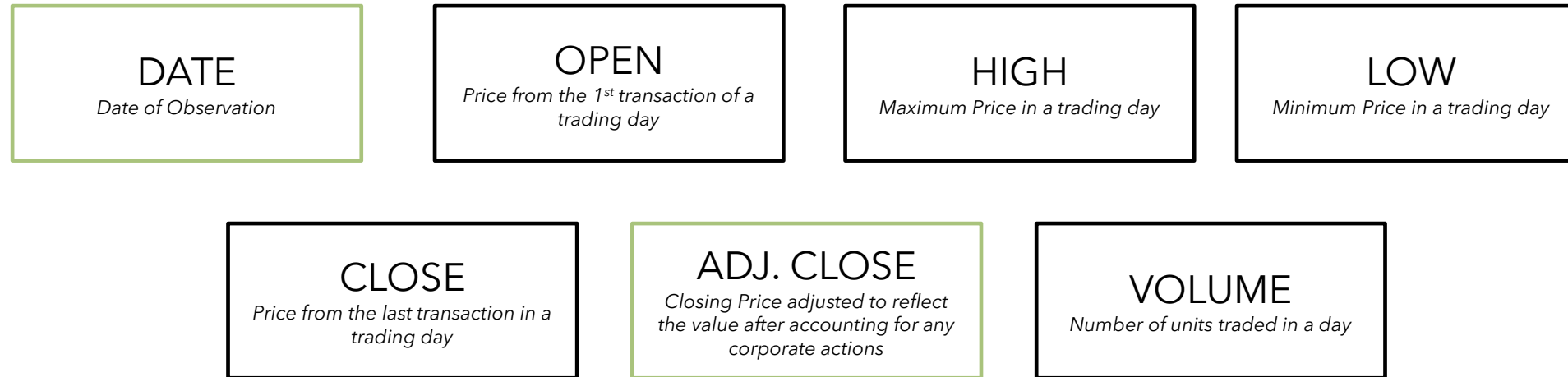
DATASETS

- Gold Dataset retrieved from Kaggle: https://www.kaggle.com/nward7/gold-historical-datasets?select=Gold_Daily+.csv
- 3 datasets available for Gold historical data: Daily, Monthly & Yearly. Daily was chosen as the preferred dataset to match the format of the Ethereum Dataset.
- Ethereum Dataset retrieved from Kaggle: <https://www.kaggle.com/varpit94/ethereum-data/version/5>



DATA PREPARATION/CLEANSING

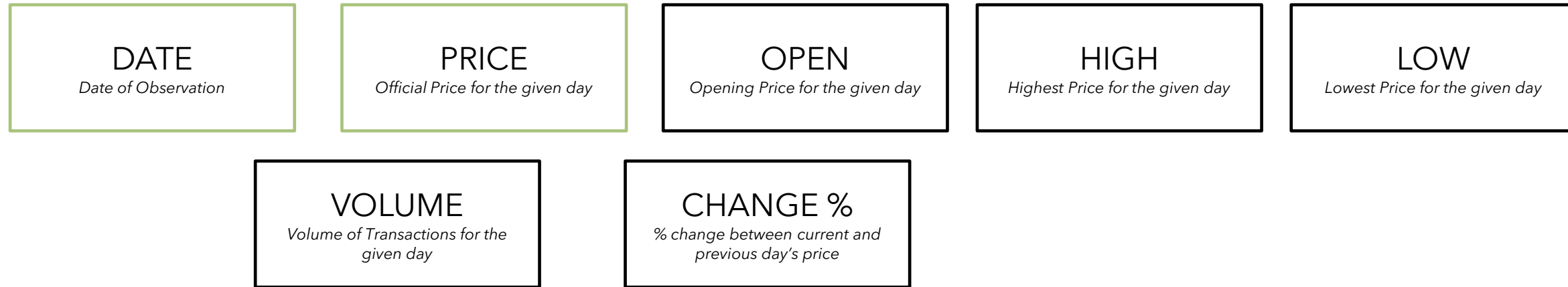
- For Ethereum dataset, the following columns are present



- We will only use the fields highlighted green in our analysis
- The Adj. Close values will be taken as the official price of Ethereum for that trading day.


DATA PREPARATION/CLEANSING


- For Gold dataset, the following columns are present.



- We will only use the fields highlighted green in our analysis
- Only historical data for gold between 2015-2020 will be used as Ethereum data is only available for that time range

DATA PREPARATION/CLEANSING

>	Table Details		#	#	#	#	Abc	#
		Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv
		Date	Price	Open	High	Low	Vol	Change %
		6/12/1994	375.8000	375.6000	376.5000	375.1000	0.99K	0.0008000
		7/12/1994	376.1000	377.0000	377.5000	375.1000	1.88K	0.0008000
		8/12/1994	376.6000	375.3000	376.7000	374.8000	0.48K	0.0013000
		9/12/1994	377.0000	375.6000	377.0000	375.5000	0.38K	0.0011000
		12/12/1994	377.5000	376.8000	377.8000	376.5000	0.07K	0.0013000
		13/12/1994	377.6000	379.5000	379.5000	378.0000	0.04K	0.0003000
		14/12/1994	378.9000	379.0000	381.0000	379.0000	0.05K	0.0034000
		15/12/1994	380.2000	379.9000	380.3000	378.9000	0.08K	0.0034000
		16/12/1994	378.6000	380.5000	380.5000	379.0000	0.04K	-0.0042000
		19/12/1994	379.2000	379.2000	379.2000	379.2000	0.01K	0.0016000
		20/12/19...	381.8000	381.8000	382.3000	381.4000	0.02K	0.0069000
		21/12/1994	381.6000	382.0000	382.0000	381.5000	0.03K	-0.0005000
		22/12/1994	381.0000	381.5000	381.5000	381.5000	0.05K	-0.0016000
		23/12/1994	380.4000	381.0000	381.0000	380.4000	0.02K	-0.0016000
		27/12/1994	381.6000	381.0000	382.0000	381.0000	0.06K	0.0032000
		28/12/19...	383.7000	382.1000	383.6000	382.1000	-	0.0055000
		29/12/19...	382.7000	382.7000	382.7000	382.7000	-	-0.0026000
		30/12/19...	383.1000	383.1000	383.1000	383.1000	-	0.0010000
		3/1/1995	379.6000	379.6000	379.6000	379.6000	-	-0.0091000
		4/1/1995	374.0000	377.7000	377.7000	374.0000	0.00K	-0.0148000
		5/1/1995	375.4000	375.4000	375.4000	375.4000	-	0.0037000

>	Table Details		#	#	#	#	#	#
		ETH-USD.csv	ETH-USD.csv	ETH-USD.csv	ETH-USD.csv	ETH-USD.csv	ETH-USD.csv	ETH-USD.csv
		Date	Open	High	Low	Close	Adj Close	Volume
		7/8/2015	2.83162	3.53661	2.52112	2.77212	2.77212	164,329
		8/8/2015	2.79376	2.79881	0.71473	0.75333	0.75333	674,188
		9/8/2015	0.70614	0.87981	0.62919	0.70190	0.70190	532,170
		10/8/2015	0.71399	0.72985	0.63655	0.70845	0.70845	405,283
		11/8/2015	0.70809	1.13141	0.66324	1.06786	1.06786	1,463,100
		12/8/2015	1.05875	1.28994	0.88361	1.21744	1.21744	2,150,620
		13/8/2015	1.22224	1.96507	1.17199	1.82767	1.82767	4,068,680
		14/8/2015	1.81092	2.26188	1.75475	1.82787	1.82787	4,637,030
		15/8/2015	1.80289	1.87724	1.57098	1.68890	1.68890	2,554,360
		16/8/2015	1.68435	1.69524	1.08981	1.56603	1.56603	3,550,790
		17/8/2015	1.58119	1.58119	1.18534	1.20361	1.20361	1,942,830
		18/8/2015	1.21530	1.33116	1.08705	1.08705	1.08705	1,485,680
		19/8/2015	1.16693	1.31799	1.16693	1.25886	1.25886	1,486,240
		20/8/20...	1.25118	1.53330	1.24833	1.46492	1.46492	2,843,760
		21/8/2015	1.47752	1.55642	1.35280	1.39529	1.39529	2,020,970
		22/8/20...	1.39629	1.47641	1.35268	1.37923	1.37923	948,310
		23/8/20...	1.37500	1.40970	1.29777	1.35259	1.35259	1,589,300
		24/8/20...	1.34559	1.36278	1.23127	1.23127	1.23127	924,920
		25/8/20...	1.22861	1.24182	1.12865	1.14019	1.14019	1,307,180
		26/8/20...	1.13279	1.20248	1.06183	1.15998	1.15998	1,056,750
		27/8/2015	1.16981	1.18883	1.13729	1.14770	1.14770	686,662

- Double check to confirm that all data columns and rows have been exported correctly.

DATA PREPARATION/CLEANSING

>	Table Details	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv
		Date	Price	Open	High	Low	Change %
		6/12/1994	375.8000	375.6000	376.5000	375.1000	0.99K
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		8/12/1994	376.6000	375.3000	376.7000	374.8000	0.48K
		9/12/1994	377.0000	375.6000	377.0000	375.5000	0.38K
		12/12/1994	377.5000	376.8000	377.8000	376.5000	0.07K
		13/12/1994	377.6000	379.5000	379.5000	378.0000	0.04K
		14/12/1994	378.9000	379.0000	381.0000	379.0000	0.05K
		15/12/1994	380.2000	379.9000	380.3000	378.9000	0.08K
		16/12/1994	378.6000	380.5000	380.5000	379.0000	0.04K
		19/12/1994	379.2000	379.2000	379.2000	379.2000	0.01K
		20/12/19...	381.8000	381.8000	382.3000	381.4000	0.02K
		21/12/1994	381.6000	382.0000	382.0000	381.5000	0.03K
		22/12/1994	381.0000	381.5000	381.5000	381.5000	0.05K
		23/12/1994	380.4000	381.0000	381.0000	380.4000	0.02K
		27/12/1994	381.6000	381.0000	382.0000	381.0000	0.06K
		28/12/19...	383.7000	382.1000	383.6000	382.1000	-
		29/12/19...	382.7000	382.7000	382.7000	382.7000	-
		30/12/19...	383.1000	383.1000	383.1000	383.1000	-
		3/1/1995	379.6000	379.6000	379.6000	379.6000	-
		4/1/1995	374.0000	377.7000	377.7000	374.0000	0.00K
		5/1/1995	375.4000	375.4000	375.4000	375.4000	-

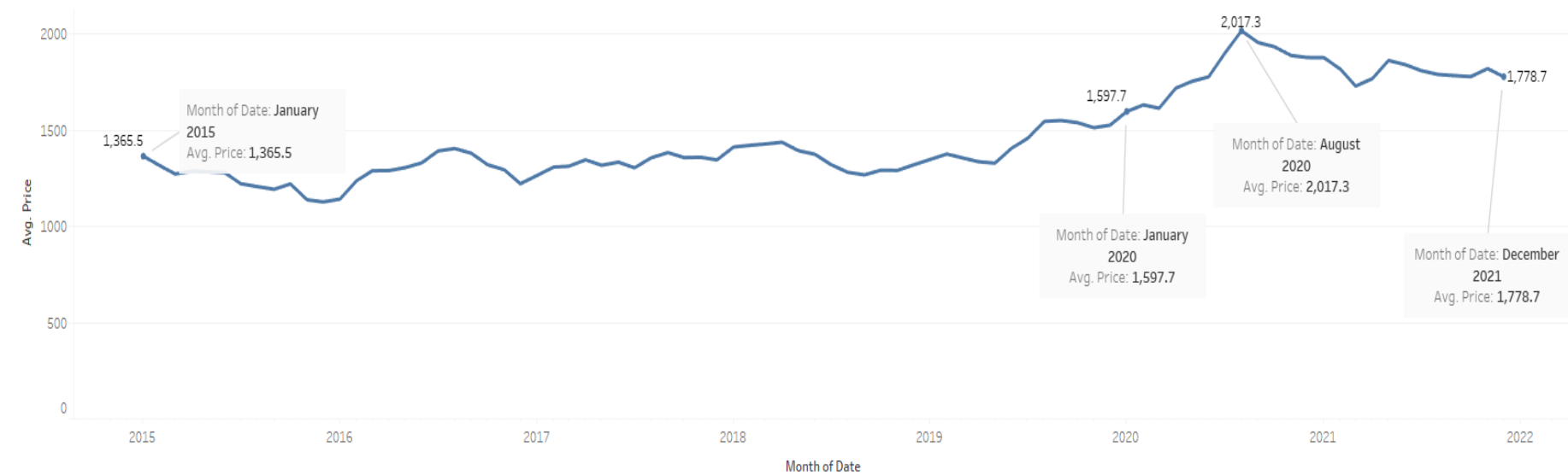
Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv	Gold_Daily .csv
Date	Price	Open	High	Low	Vol	Vol (ADJ)	Change %
6/12/1994	375.8000	375.6000	376.5000	375.1000	0.9900	990	0.0008000
7/12/1994	376.1000	377.0000	377.5000	375.1000	1.8800	1.880	0.0008000
8/12/1994	376.6000	375.3000	376.7000	374.8000	0.4800	480	0.0013000
9/12/1994	377.0000	375.6000	377.0000	375.5000	0.3800	380	0.0011000
12/12/1994	377.5000	376.8000	377.8000	376.5000	0.0700	70	0.0013000
13/12/1994	377.6000	379.5000	379.5000	378.0000	0.0400	40	0.0003000
14/12/1994	378.9000	379.0000	381.0000	379.0000	0.0500	50	0.0034000
15/12/1994	380.2000	379.9000	380.3000	378.9000	0.0800	80	0.0034000
16/12/1994	378.6000	380.5000	380.5000	379.0000	0.0400	40	0.0042000
19/12/1994	379.2000	379.2000	379.2000	379.2000	0.0100	10	0.0016000
20/12/19...	381.8000	381.8000	382.3000	381.4000	0.0200	20	0.0069000
21/12/1994	381.6000	382.0000	382.0000	381.5000	0.0300	30	0.0005000
22/12/1994	381.0000	381.5000	381.5000	381.5000	0.0500	50	0.0016000
23/12/1994	380.4000	381.0000	381.0000	380.4000	0.0200	20	0.0016000
27/12/1994	381.6000	381.0000	382.0000	381.0000	0.0600	60	0.0032000
28/12/19...	383.7000	382.1000	383.6000	382.1000	0.0000	0	0.0055000
29/12/19...	382.7000	382.7000	382.7000	382.7000	0.0000	0	0.0026000
30/12/19...	383.1000	383.1000	383.1000	383.1000	0.0000	0	0.0010000
3/1/1995	379.6000	379.6000	379.6000	379.6000	0.0000	0	0.0091000
4/1/1995	374.0000	377.7000	377.7000	374.0000	0.0000	0	0.0148000
5/1/1995	375.4000	375.4000	375.4000	375.4000	0.0000	0	0.0037000
6/1/1995	371.2000	375.3000	375.3000	372.0000	0.0100	10	0.0112000
9/1/1995	373.1000	373.1000	373.1000	373.1000	0.0000	0	0.0051000
10/1/1995	374.3000	374.3000	374.3000	374.3000	0.0000	0	0.0032000

- New column created to convert "K" into thousand. Root .csv data defined "K" as a general letter, not a short form of thousand.
- Null values replaced with 0

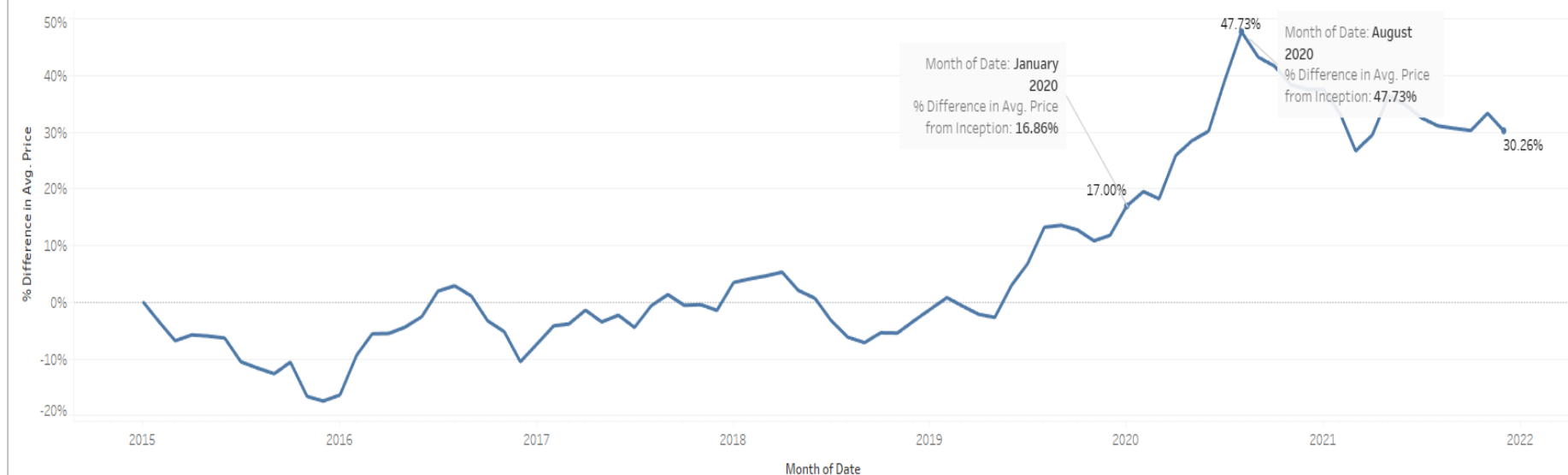
ANALYSIS OF GOLD DATA

- Taking Jan 2015 as inception period, returns after 5 years is ~17%
- Holding the investment longer till end 2021 will yield a higher return of ~30%
- Maximum returns of ~47% could be realized in Aug 2020.

Avg Price of Gold from 2015-2021



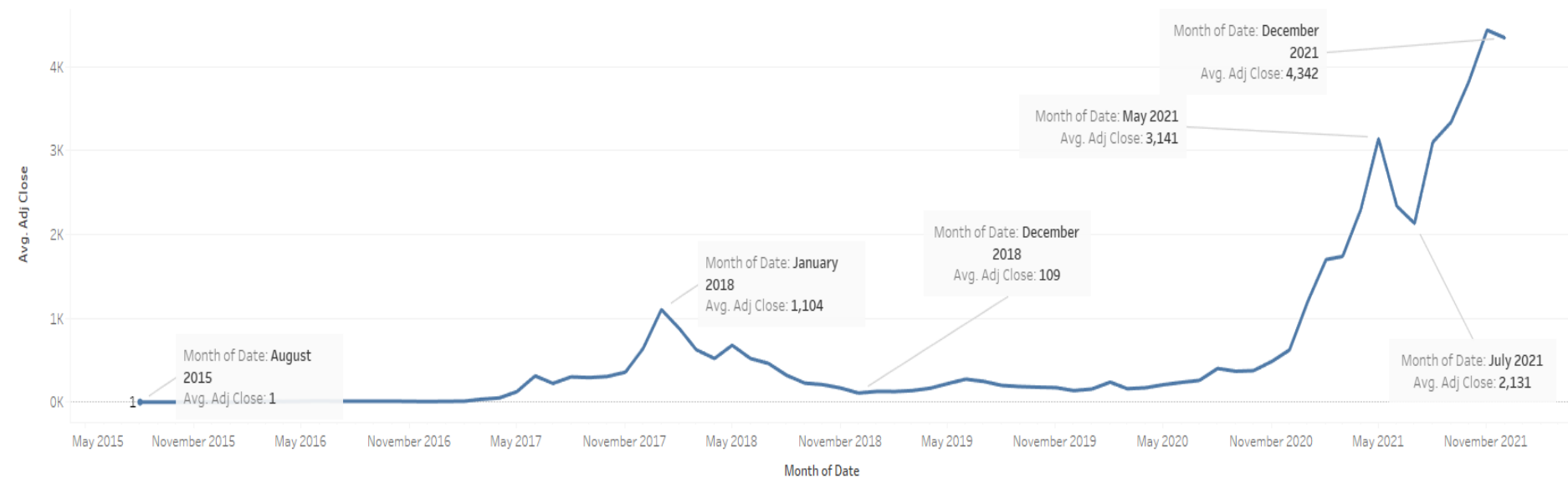
% Difference in Avg Price of Gold from 2015-2021



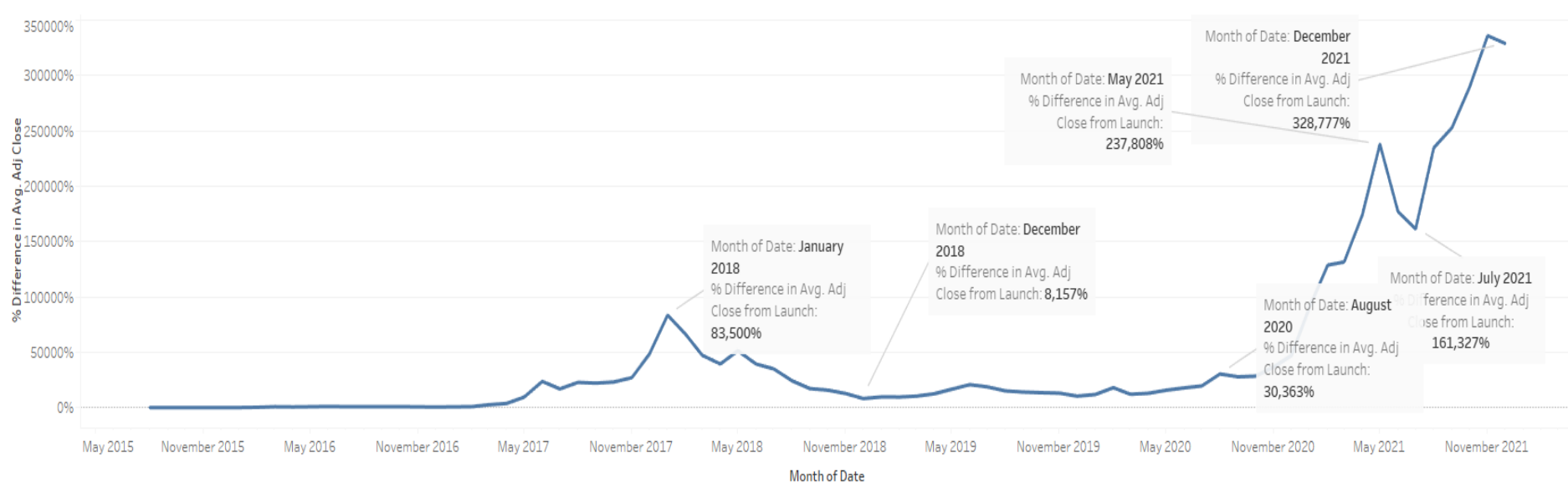
ANALYSIS OF ETH DATA

- ETH price have surged 328,777% to an all time high since launch in Aug 2015
- A 5-year investment period from launch till Aug 2020 will yield a 30,363% return
- ETH had a 10-fold surge starting from ~Nov 2020
- A couple of big pullbacks can be seen throughout ETH historical data.

Avg Adj. Close of ETH



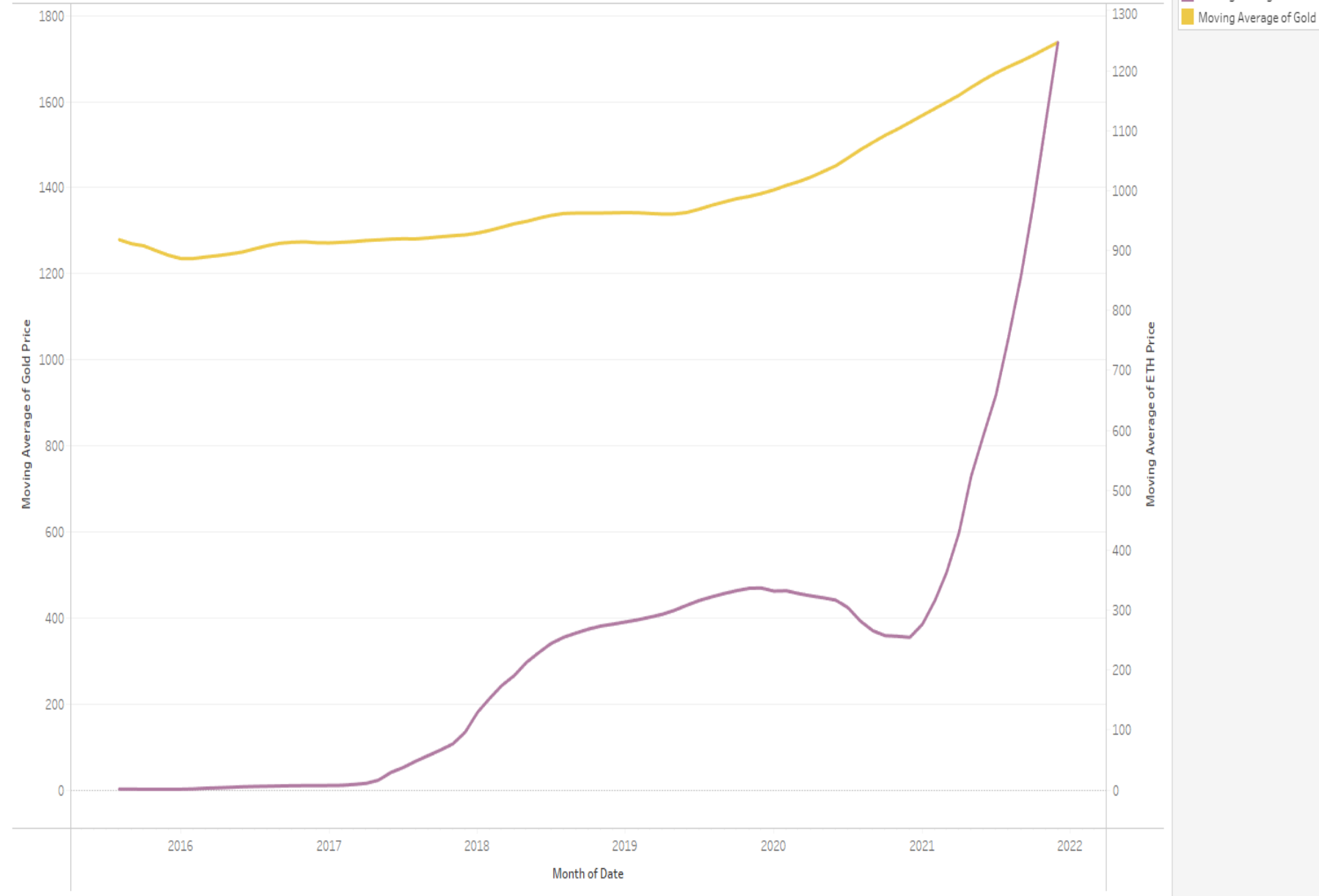
% diff of ETH



MOVING AVERAGE

- 30-day Moving Average calculated for Gold & ETH.
- Both Gold and ETH show increasing trends
- ETH's surge is much larger compared to Gold and in a much shorter time frame

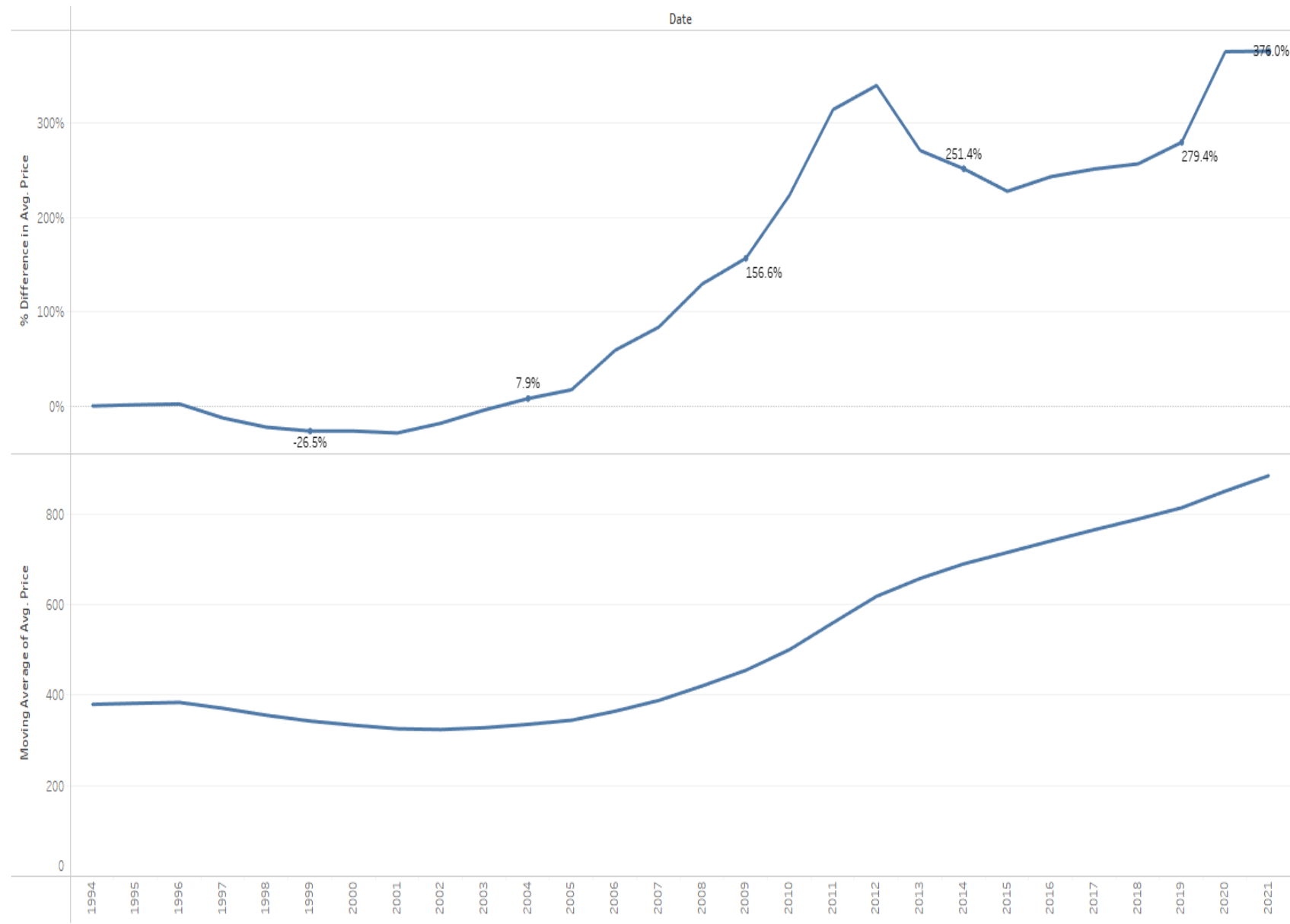
Moving Average Trends of Gold & ETH



MORE INSIGHTS INTO GOLD

- Historical data of Gold before 2015 looked at to compare previous 5-year changes in price
- With the exception of 1994-1999, all 5-year horizons have yielded positive growth
- Overall percentage growth of gold, however, still pales in comparison to ETH

Gold Historical Data from 1994-2021



CONCLUSIONS ON BOTH OPTIONS

- For a 5- year investment horizon, investing in ETH will most likely yield a much higher return than investing in gold, although we will not probably see such a big scale of explosive growth.
- Gold investments would be preferred for longer investment horizons and as a stabilizing addition to the overall portfolio
- ETH is much more volatile than Gold; timing on when to cash out the investments will be more crucial when investing in ETH than in Gold.
- As ETH is relatively new compared to Gold, limitations on the amount of data available for ETH can make it hard to predict ETH trends; there is a higher chance of getting a positive return on gold at the end of a 5-year horizon.

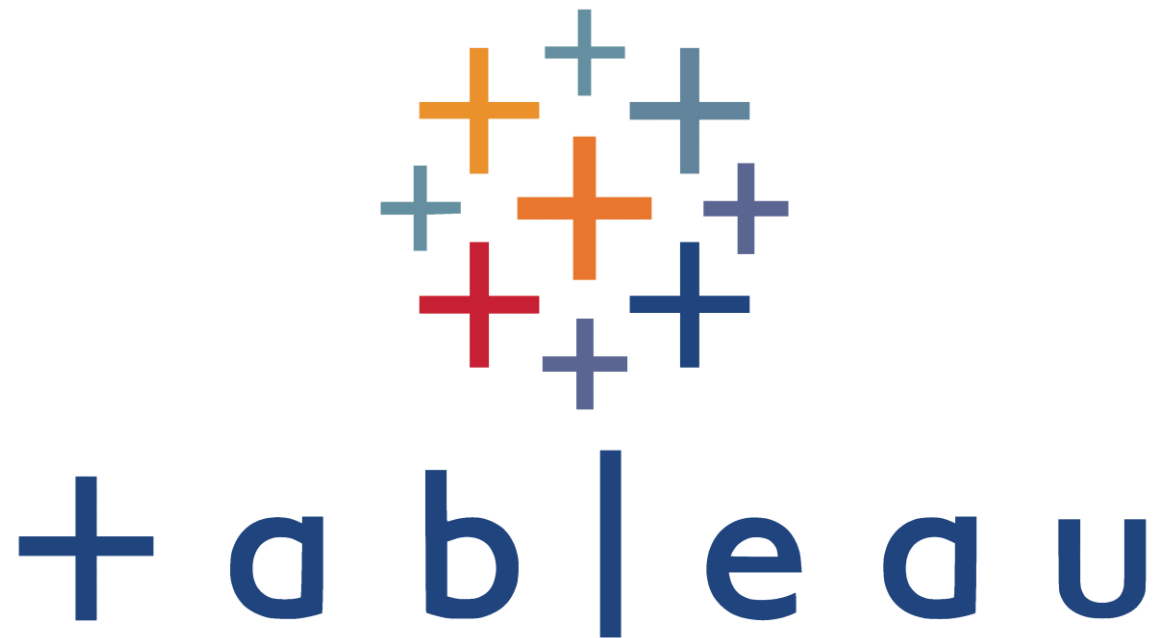


TABLEAU PUBLIC LIVE

- https://public.tableau.com/app/profile/filbert.koh/viz/CAPSTONEPROJECT_16404178638720/Story1?publish=yes

THE END

THANK YOU FOR YOUR
KIND ATTENTION

