

The background of the slide is a close-up, slightly blurred image of a laptop screen. On the screen, a financial candlestick chart is visible, showing price movements over time. A straight line is drawn across the chart, representing a linear regression model for price prediction. The chart has a grid background and includes date labels at the top: '1 Tag', '3 Monate', '21 Dez.', and '4 Jan.'. The candlesticks are colored green and red. The title 'PRICE PREDICTION' is centered over the chart, with 'PRICE' in white and 'PREDICTION' in orange.

# PRICE PREDICTION

for the Stock Market

# RESEARCH QUESTION:

A comparison of advanced ML forecasting models' ability to predict monthly stock prices in both univariate and multivariate scenarios.

# 2 DATASETS

## 01 “HUGE STOCK MARKET DATASET”

Daily adjusted Open, High, Low, Close prices and Volume from 1970s–80s to 2017 11 10

## 02 “FINANCIAL STATEMENTS OF MAJOR COMPANIES”

very narrow list of selected companies with annual financial statements from 2009 – 2023

01 Date,Open,High,Low,Close,Volume,OpenInt  
1984-09-07,0.42388,0.42902,0.41874,0.42388,23220030,0  
1984-09-10,0.42388,0.42516,0.41366,0.42134,18022532,0  
1984-09-11,0.42516,0.43668,0.42516,0.42902,42498199,0  
1984-09-12,0.42902,0.43157,0.41618,0.41618,37125801,0  
1984-09-13,0.43927,0.44052,0.43927,0.43927,57822062,0  
1984-09-14,0.44052,0.45589,0.44052,0.44566,68847968,0  
1984-09-17,0.45718,0.46357,0.45718,0.45718,53755262,0  
1984-09-18,0.45718,0.46103,0.44052,0.44052,27136886,0  
1984-09-19,0.44052,0.44566,0.43157,0.43157,33644000,0

02

Year	Company	Category	Market Cap	Revenue	Gross Profit	Net Income	Earnings Per Share	EBITDA	Share Holders
2022	AAPL	IT	2066.94	394328	170782	99803	6.11	130541	50672
2021	AAPL	IT	2913.28	365817	152836	94680	5.61	120233	63090
2020	AAPL	IT	2255.97	274515	104956	57411	3.28	77344	65339
2019	AAPL	IT	1304.76	260174	98392	55256	2.97	76477	90488
2018	AAPL	IT	748.54	265595	101839	59531	2.98	81801	107147
2017	AAPL	IT	868.87	229234	88186	48351	2.3025	71501	134047
2016	AAPL	IT	617.59	215639	84263	45687	2.0775	70529	128249
2015	AAPL	IT	586.86	233715	93626	53394	2.305	82487	119355
2014	AAPL	IT	647.36	182795	70537	39510	1.6125	60449	111547
2013	AAPL	IT	504.79	170910	64304	37037	1.42	55756	123549
2012	AAPL	IT	500.61	156508	68662	41733	1.5775	58518	118210
2011	AAPL	IT	376.4	108249	43818	25922	0.9886	35604	76615
2010	AAPL	IT	296.89	65225	25684	14013	0.5411	19412	47791
2009	AAPL	IT	189.8	42905	17222	8235	0.3243	12474	31640
2023	MSFT	IT	2451.23	211915	146052	72361	9.68	102384	206223
2022	MSFT	IT	1787.73	198270	135620	72738	9.65	97843	166542
2021	MSFT	IT	2525.08	168088	115856	61271	8.05	81602	141988
2020	MSFT	IT	1681.61	143015	96937	44281	5.76	65755	118304

STATUS UPDATE

# RNN

PRICES ONLY



# RNN

PRICES + FINANCIAL STATEMENTS



# LSTM

PRICES ONLY



# LSTM

PRICES + FINANCIAL STATEMENTS





# CHOSEN STOCKS

# DATA

9 stocks from financial statements dataset

Monthly Price Data: 2009–2017

- AAPL
- MSFT
- AIG
- PCG
- MCD
- BCS
- NVDA
- INTC
- AMZN

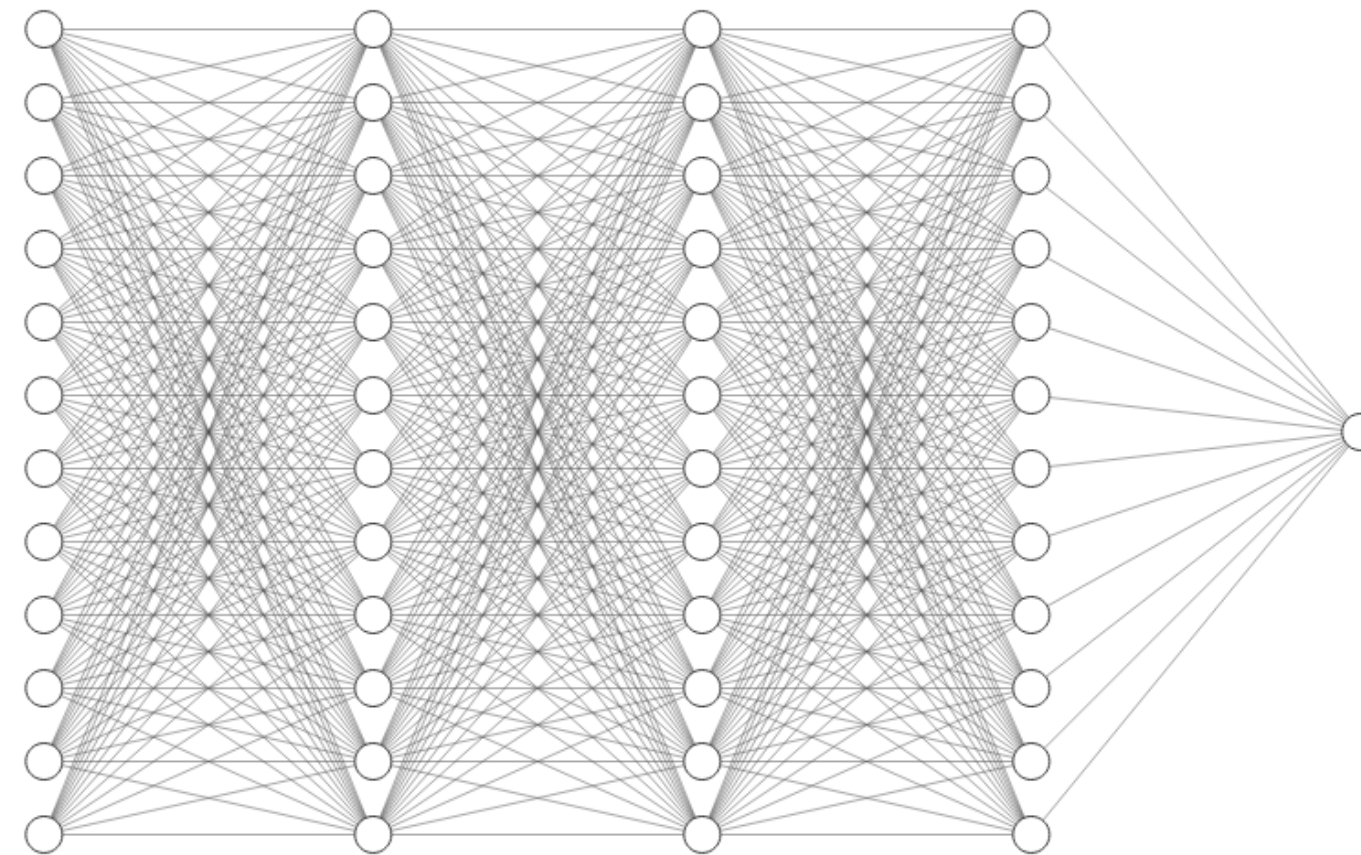
## RNN MODEL ON PRICES ONLY

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## RNN MODEL ON PRICES WITH FINANCIAL STATEMENTS

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- **75%/25% TRAIN TEST SPLIT**
- **APPLIED MINMAX SCALER**
- **LOOKBACK OF 12**
- **THE MODELS:**
  - 4 LAYERS OF SIMPLE RNN UNITS  
EQUAL IN NUMBER TO LOOKBACK
  - DROPOUT=0.2
  - 50 EPOCHS



# DIFFERENCE

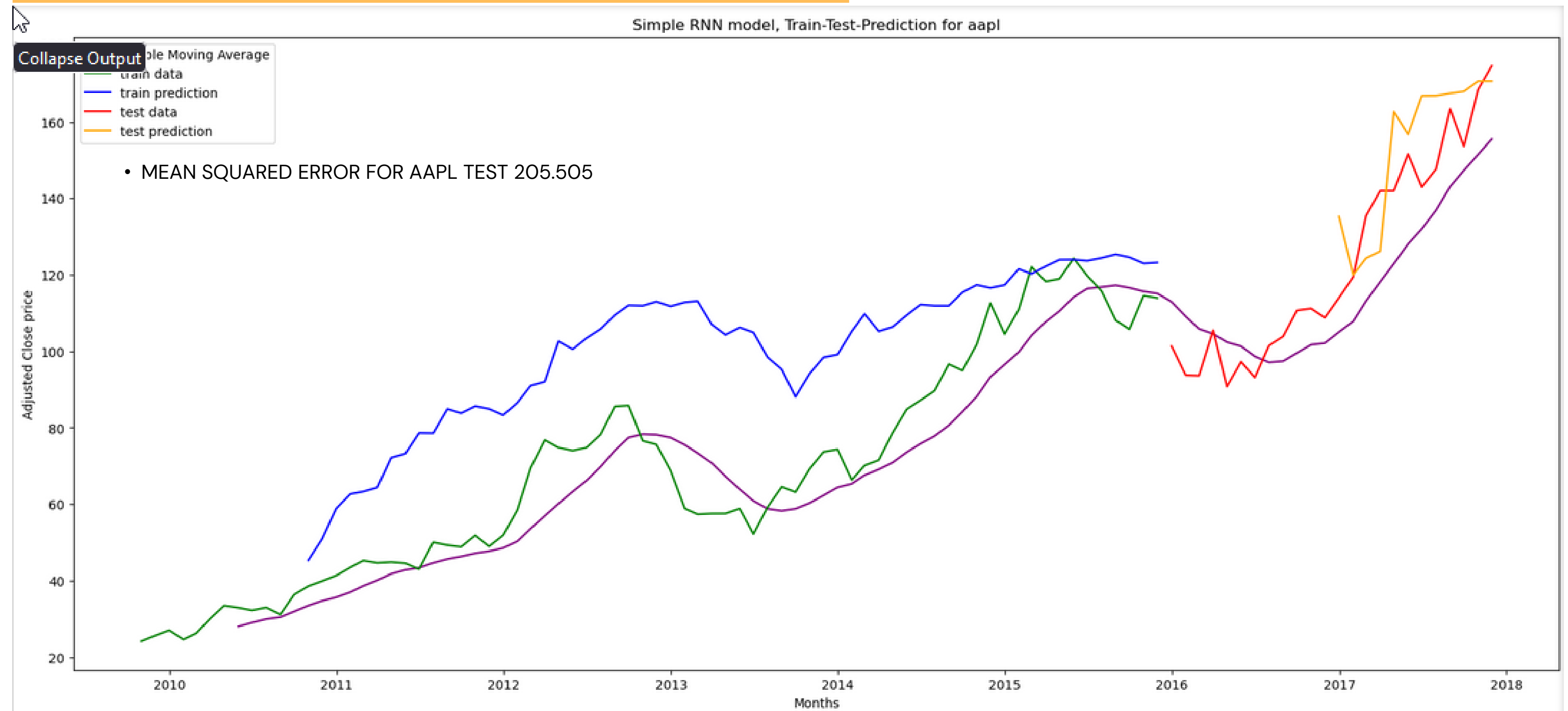
## 1 VARIABLE

- PRICE

## 23 VARIABLES

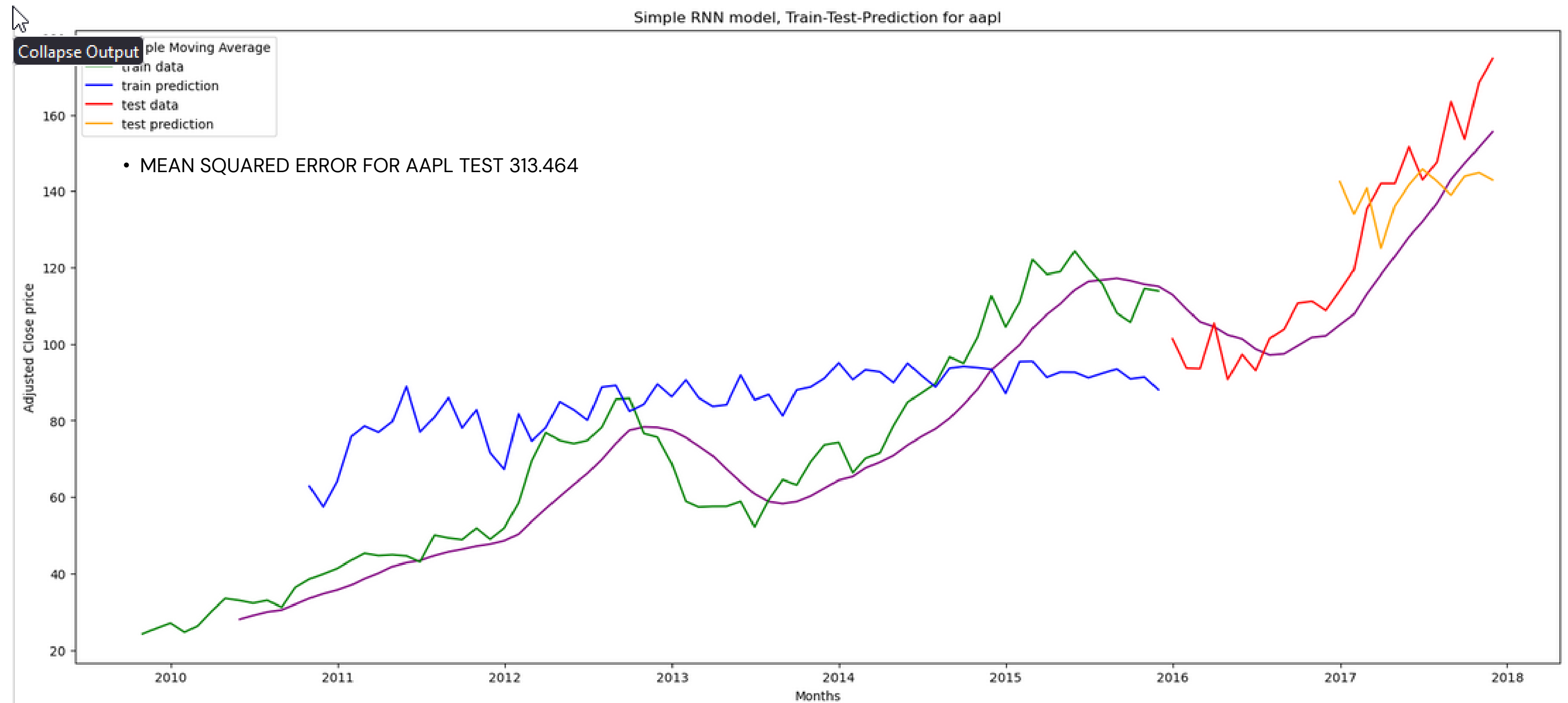
- PRICE
- VOLUME
- RETURNS
- MARKET CAP
- REVENUE
- GROSS PROFIT
- NET INCOME
- EARNINGS PER SHARE
- EBITDA
- EQUITY
- CASH FLOW FROM OPERATIONS
- CASH FLOW FROM INVESTMENTS
- CASH FLOW FROM FINANCIAL ACTIVITIES
- CURRENT RATIO
- DEBT/EQUITY RATIO
- ROE
- ROA
- ROI
- NET PROFIT MARGIN
- FREE CASH FLOW PER SHARE
- RETURN ON TANGIBLE EQUITY
- NUMBER OF EMPLOYEES
- INFLATION RATE

## TRAIN AND TEST DATA AND PREDICTION FOR AAPL ON PRICES ONLY

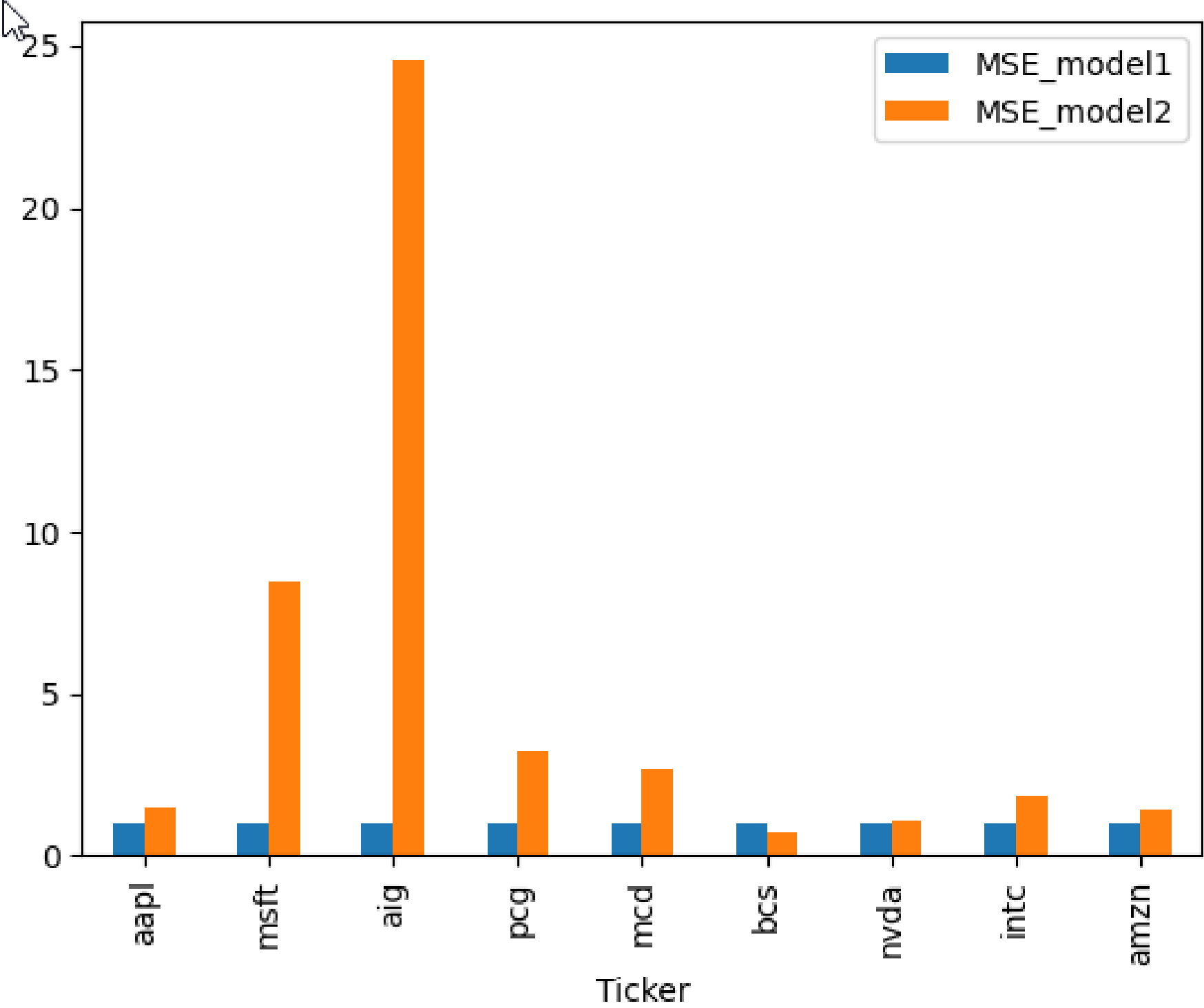




## TRAIN AND TEST DATA AND PREDICTION FOR AAPL ON PRICES WITH FINANCIAL STATEMENTS



RELATIVE COMPARISON OF MSE OF 2 MODELS , BY TICKER



MODEL 1 – MODEL WITH PRICES ONLY  
MODEL 2 – MODEL WITH PRICES AND FINANCIAL STATEMENTS

# CONCLUSIONS:

MY EXPECTATIONS WERE NOT CONFIRMED BY THE REALITY.

MODEL WITH FINANCIAL STATEMENTS PERFORMED POORLY IN COMPARISON WITH PRICES ONLY MODEL.

SIMPLICITY 1 : COMPLEXITY 0

# GET IN TOUCH

Thank You for Attention

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