

Maximizing Returns for the Average Investor

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Motivation and Practical Questions

Can we make a model that predicts stock price?

Can average investors use this to make money?



Robinhood

Research Question

What information can be used to predict stock prices?

What drives the price of a stock?

End of the day: All that traders/investors care about is the price of the stock.

If there are other measurable variables that can help predict price then it is useful to understand these variables to maximize returns.

Companies in Our Analyses

Apple (AAPL)

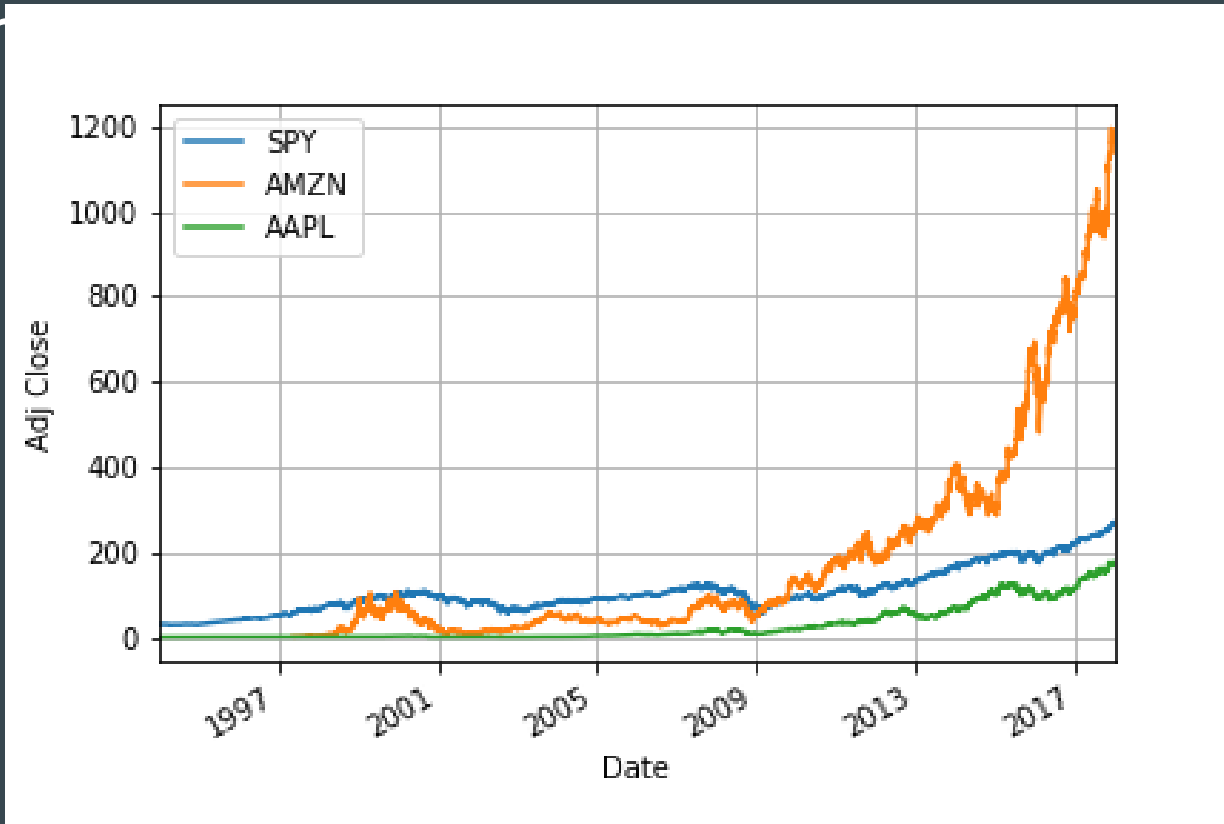
- Highest market cap
- Tech company
- Available data (1993-Present)
- Media coverage



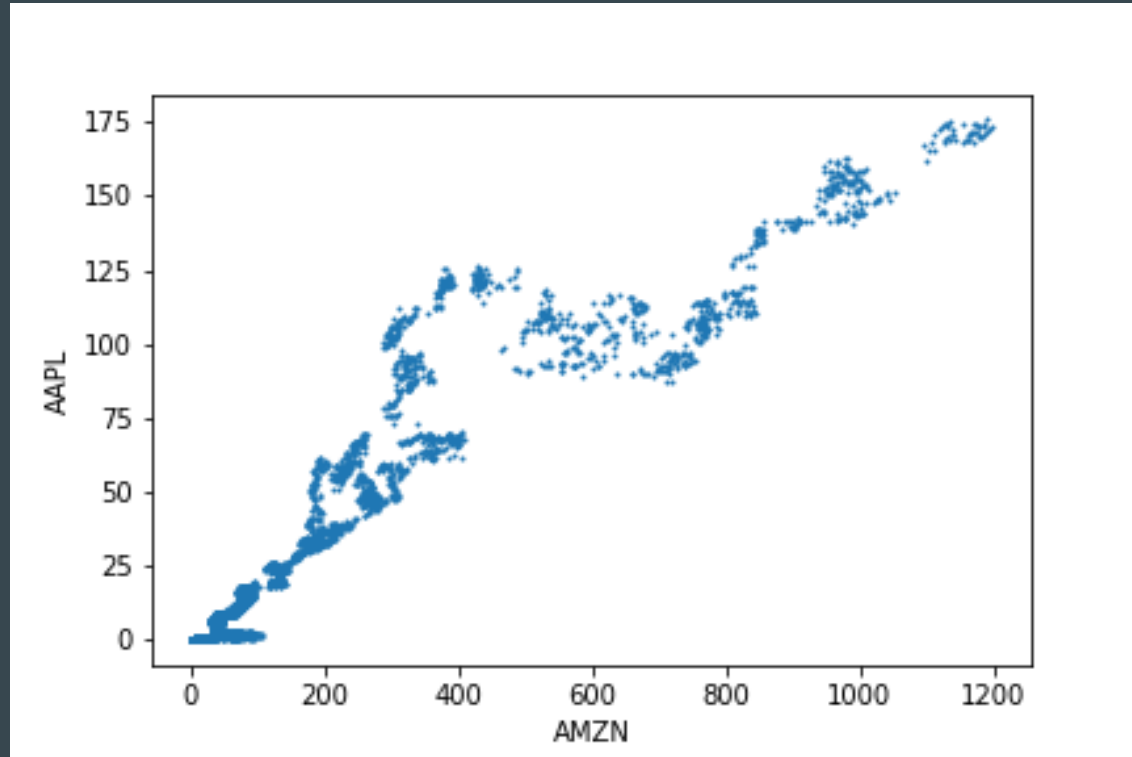
Amazon (AMZN)

- High per share value
- Tech company
- Available data (1998-Present)
- Media coverage

Price of SPY, AMZN and AAPL from 1993 to Present



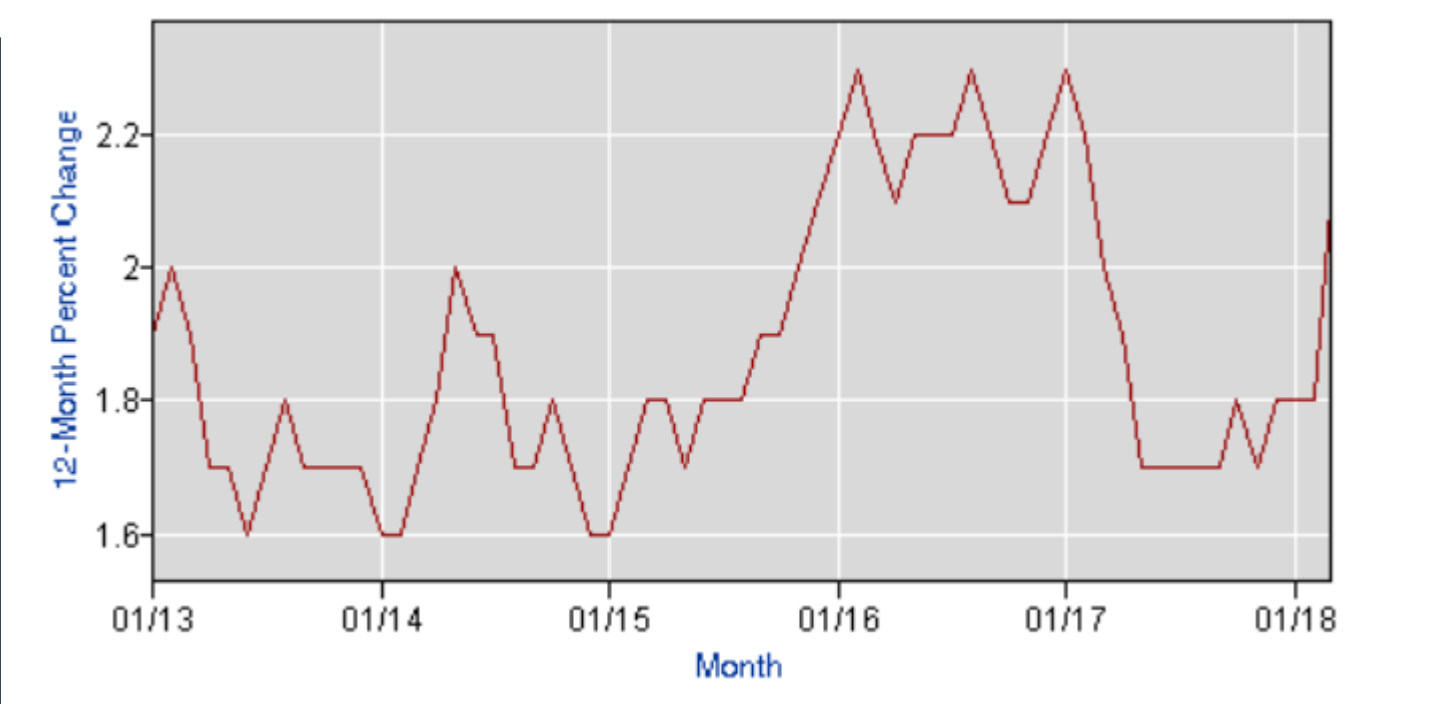
Scatter Plot of AMZN Price vs AAPL Price



The prices of these stocks are highly correlated: -- Pearson Correlation Coefficient: 0.947

What data is out
there?

National Labor Statistics -- Bureau of Labor Statistics



Inflation rate in the United States over the past 5 years

Price of a Stock Through Time -- Yahoo Finance



Price of AMZN over the past 5 years

Earnings Reports and Earnings Estimates -- Zacks

Earnings Announcements for AMAZON.COM INC

Date	Period Ending	Estimate	Reported	Surprise	Surprise%
26-APR-18	Mar 2018	\$1.22	\$3.27	2.05	168.03 %
01-FEB-18	Dec 2017	\$1.85	\$2.16	0.31	16.76 %
26-OCT-17	Sep 2017	\$0.01	\$0.52	0.51	5,100.00 %
27-JUL-17	Jun 2017	\$1.40	\$0.40	-1.00	-71.43 %
27-APR-17	Mar 2017	\$1.03	\$1.48	0.45	43.69 %
02-FEB-17	Dec 2016	\$1.40	\$1.54	0.14	10.00 %
27-OCT-16	Sep 2016	\$0.85	\$0.52	-0.33	-38.82 %
28-JUL-16	Jun 2016	\$1.14	\$1.78	0.64	56.14 %
28-APR-16	Mar 2016	\$0.61	\$1.07	0.46	75.41 %
28-JAN-16	Dec 2015	\$1.61	\$1.00	-0.61	-37.89 %

AMZN Earnings Report for previous 10 quarters

Fundamental Analysis

Uses economic/financial climate and measures of a company's health to predict price

Technical Analysis -- only looks at price movement to predict future price

Fundamental Analysis allows you to make more informed long-term investment decisions

Does the market/economy/company support price growth?

List of Fundamental Indicators Used

Dividend payout ratio	EPS diluted	Long-term debt to equity ratio
Shares	Dividend per share	Equity to assets ratio
Shares split adjusted	Cash from operating activities	Net margin
Split factor	Cash from investing activities	Asset turnover
Assets	Cash from financing activities	Free cash flow per share
Current Assets	Cash change during period	Current ratio
Liabilities	Cash at end of period	Earnings
Current Liabilities	Capital expenditures	Earnings available for common stockholders
Shareholders' equity	Price	EPS basic
Non-controlling interest	Price high	P/B ratio
Preferred equity	Price low	P/E ratio
Goodwill and intangibles	ROE	Cumulative dividends per share
Long-term debt	ROA	
Revenue	Book value of equity per share	

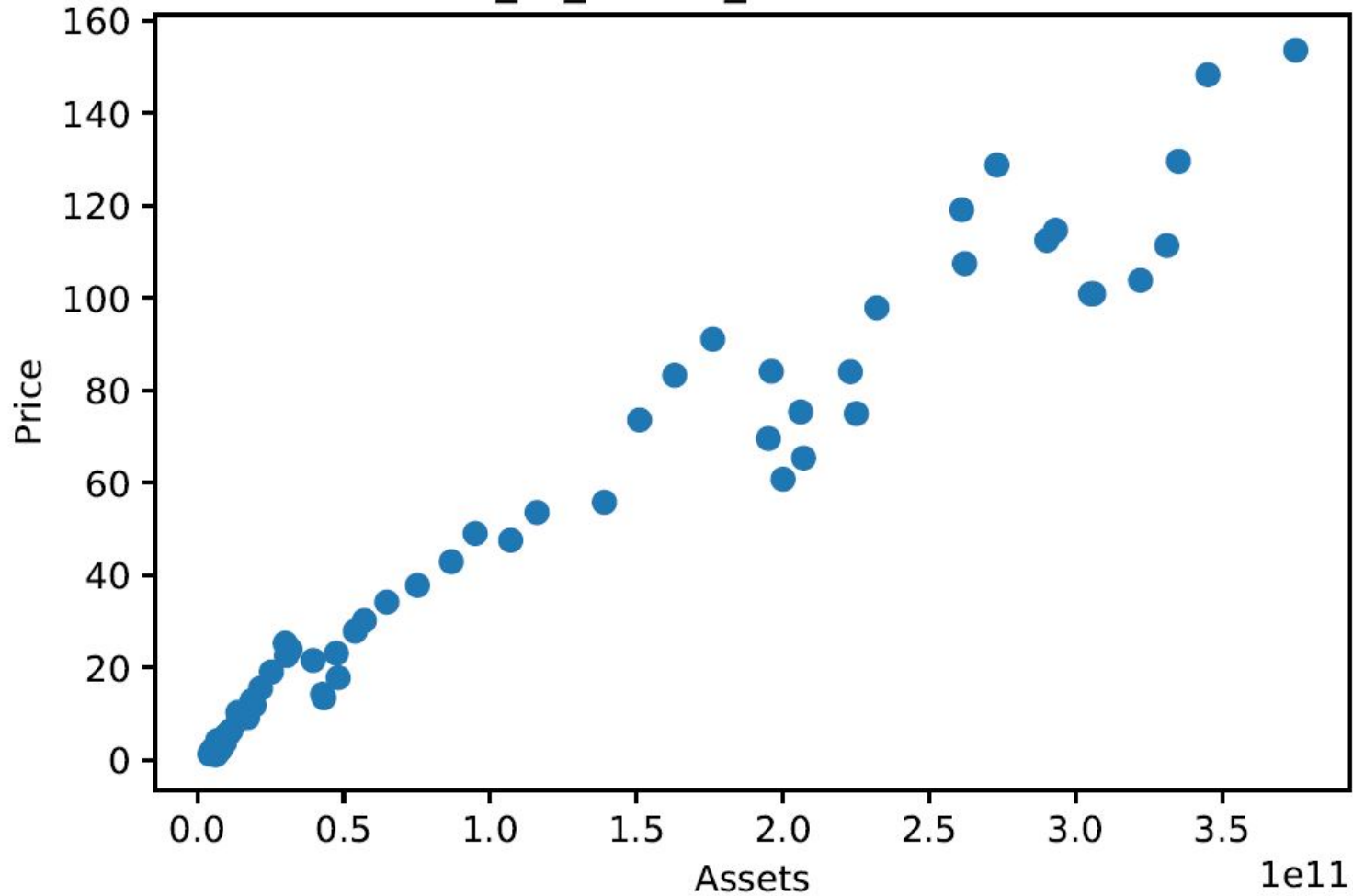
1. How do we narrow down this list?
2. Which fundamental indicators drive price?

Correlating Fundamental Indicators With Price

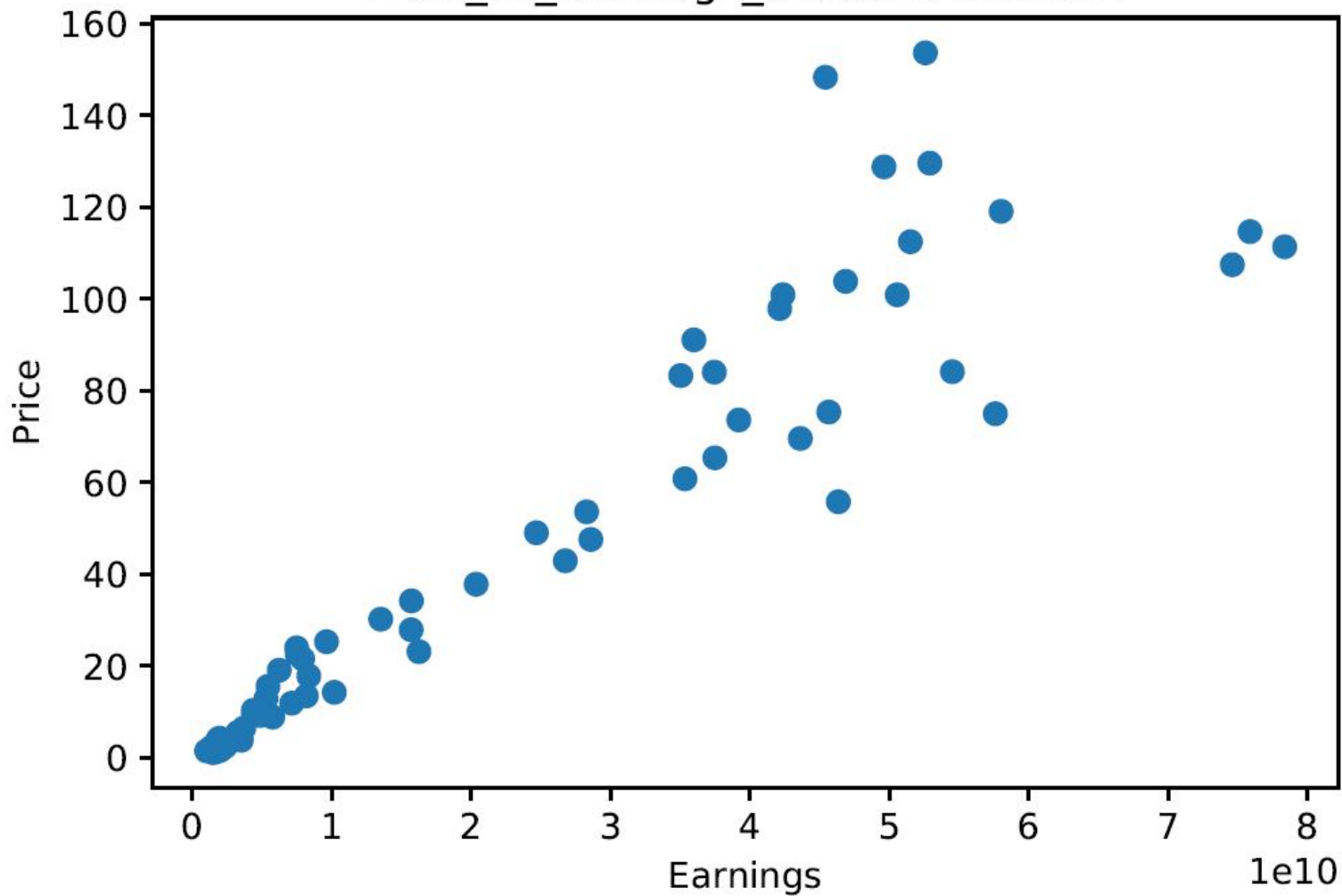
Remove Fundamental Indicators that have no correlation with Price

Remove Fundamental Indicators that have Price baked in

Price_vs_Assets_0.980397852058

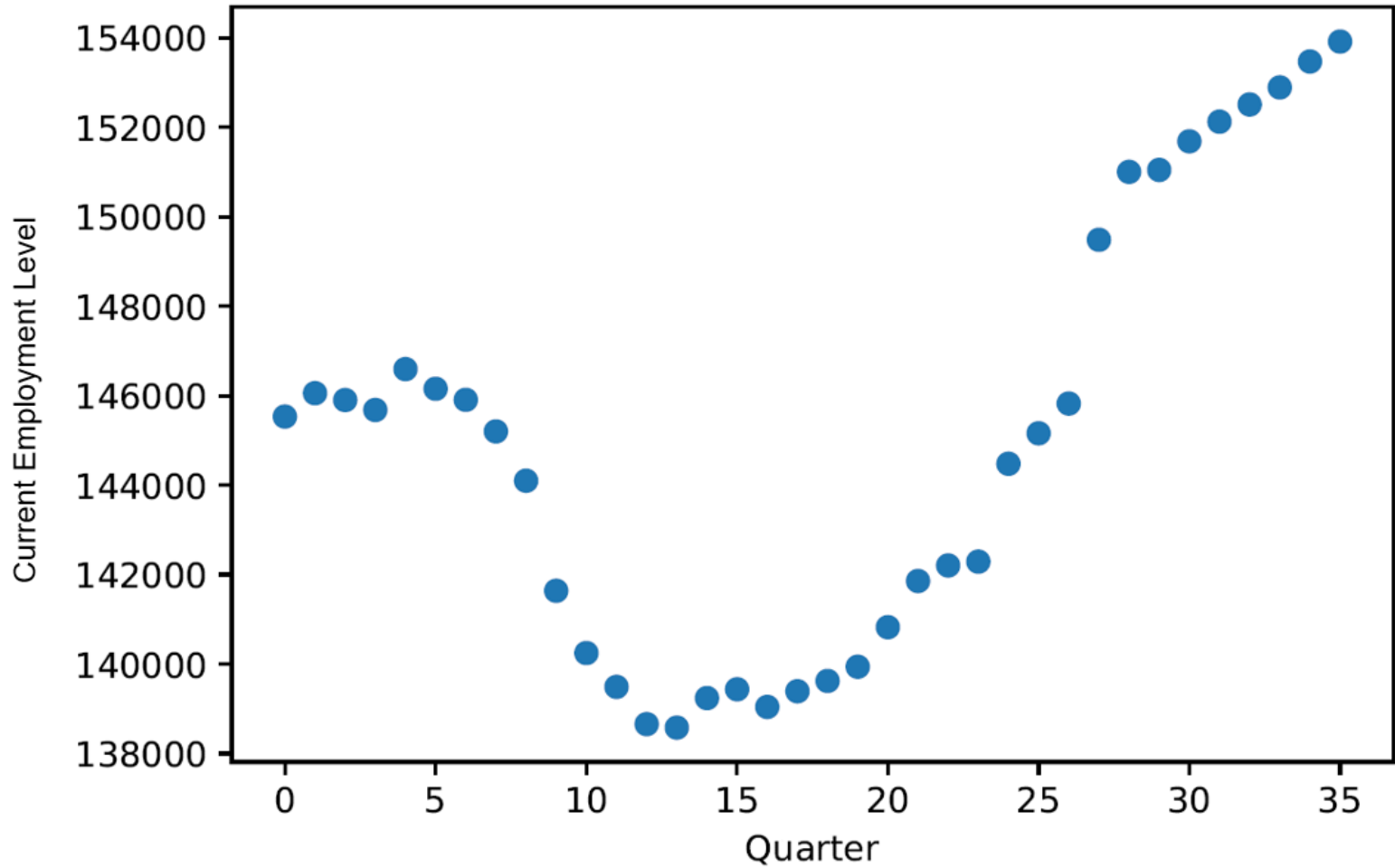


Price_vs_Earnings_0.898294238224



What effect does
the national scene
have on stock
price?

current_employment_level through time



How do we use all
this data to predict
stock prices?

Generalized Linear Model

Model Setup

Obtain quarterly data from multiple sources

Run correlations with stock price variables for initial weeding out

Training

Run stepwise generalized linear regression on historical dataset to obtain significant indicators responsible for changes in stock price

Testing

Predict stock price (forecasting) on test dataset using the linear model

Significant Indicators from our model

AAPL

Assets, Liabilities, Shareholders' equity, Goodwill and intangibles, EPS basic, ROE, Book value of equity per share, Dividend payout ratio, Current employment level

AMZN

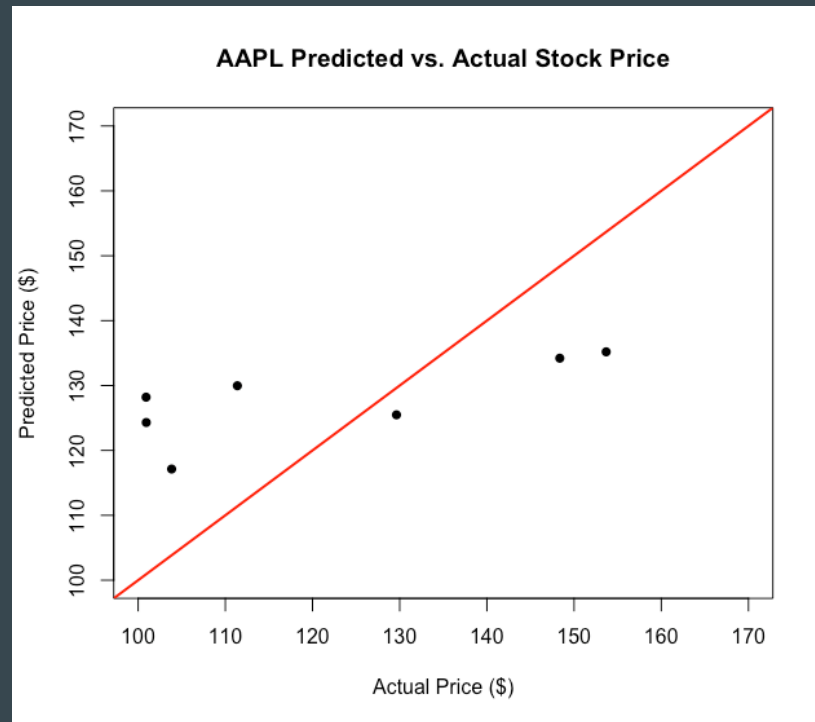
Current liabilities, Long-term debt, Book value of equity per share

AAPL Predictions

AAPL adjusted R^2 value: 0.9842

Average prediction error: + \$13.29

Overvalued stock price



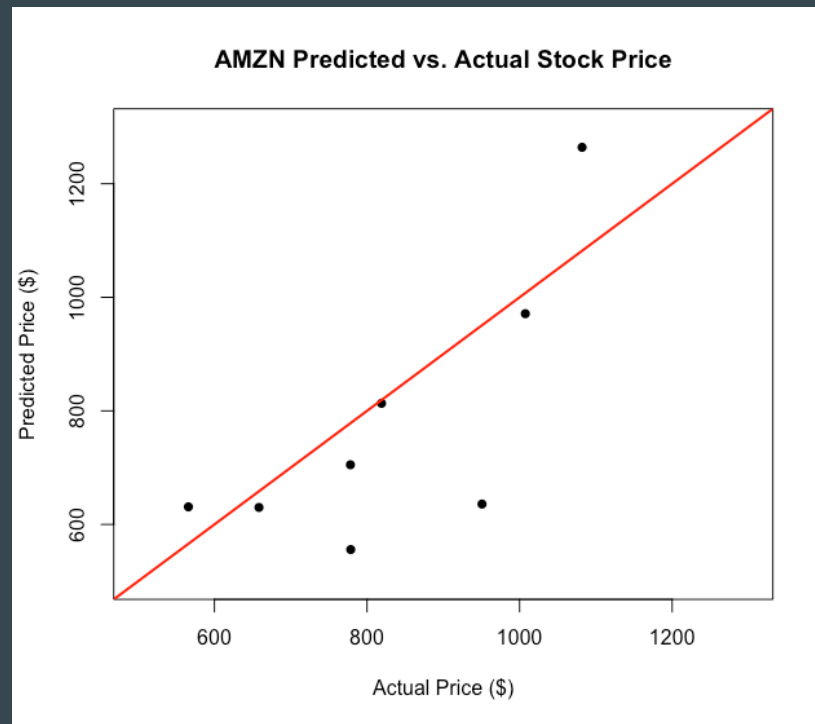
True = Predicted Stock Price (Red line)

AMZN Predictions

AMZN adjusted R^2 value: 0.9847

Average prediction error: - \$36.41

Undervalued stock price



True = Predicted Stock Price (Red line)

Benchmarking

Forecast Model	Stock Price % Change
Actual stock price (2016-17)	+34.38% (AAPL), +47.7% (AMZN)
MoneyMaker (ICGE) (2016-17)	+5.17% (AAPL), +50.09% (AMZN)

Do you trust our
model to make your
own investment
decisions?

Conclusions

This model is a good start

There are always more variables that can be included

Should you trust this model with your money?

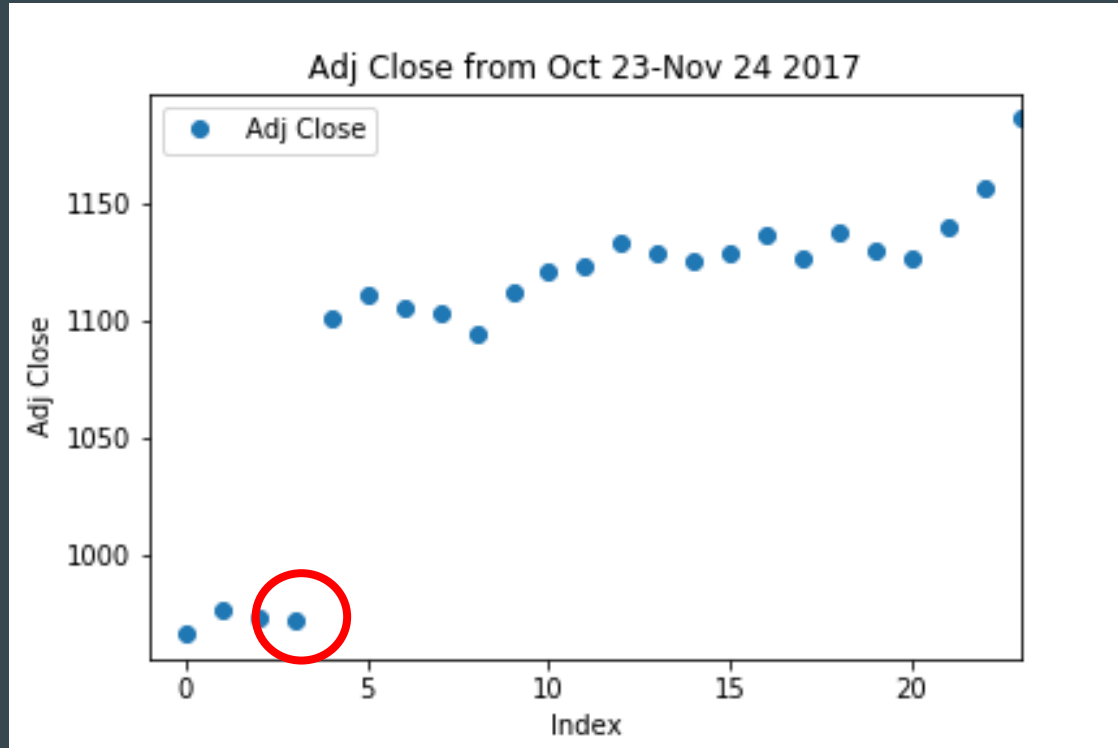
Effects of Earnings Reports

Earnings are released every financial quarter

Earnings estimates are calculated before the earnings reports are released

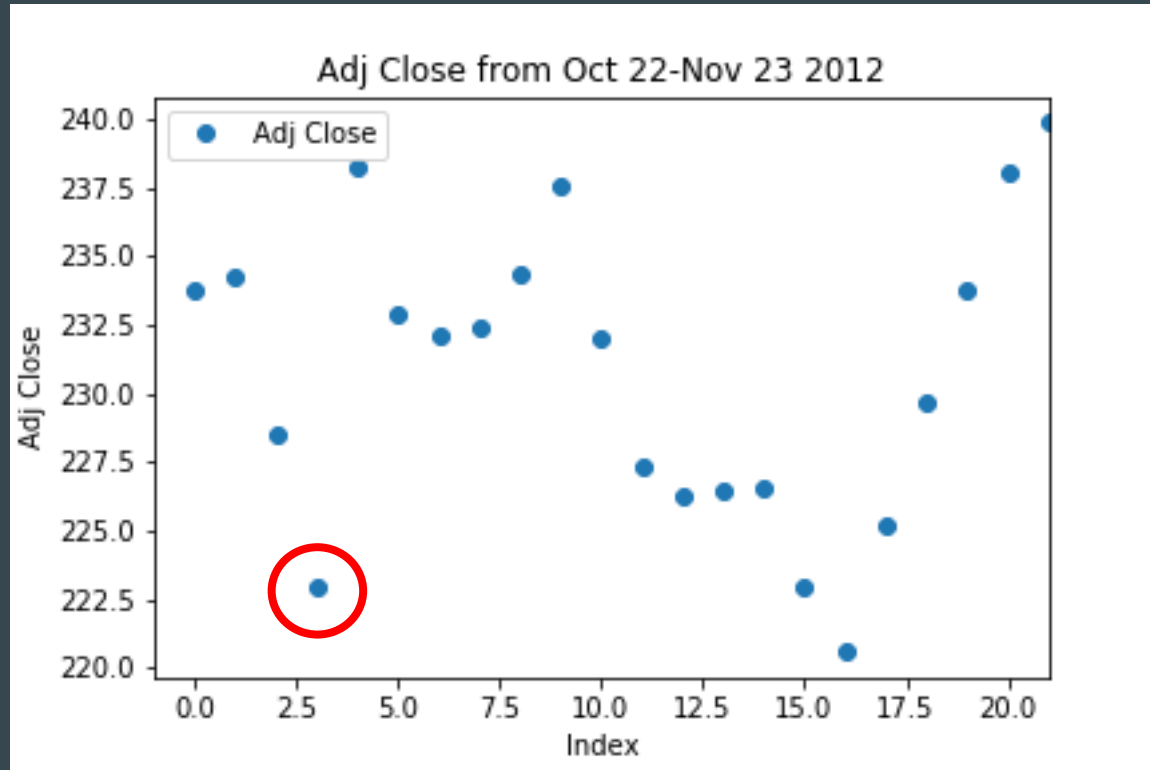
Deviations from earnings estimates can lead to changes in price

Earnings Deviations AMZN



Largest positive deviation 5100% -- Reported October 26, 2017

Earnings Deviations AMZN



Largest negative deviation -187.5% -- Reported October 25, 2012

Future work

Establish better time frame for earnings analysis

Look to see if price x days in future correlates with surprise%

Gather more measures of public opinion of a company.

Twitter mentions with cashtag (\$AAPL, \$AMZN)

Major headlines/news stories with company name

Gather measures of national attitude toward investing and economy

Political policies

Stock market momentum

Acknowledgement

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