Evaluating historical performance

10/2/17

Overview

- To make investment decisions, our firm estimates future financial metrics for potential investment decisions
- We believe the data that we collect has predictive power on the efficacy of our investment decisions
- To validate our belief in the value of our proprietary data, I evaluated 5 years of historical stock price performance against several features

Data

- Internally generated data
  - Before making investments, we log our estimates for future financial performance
  - Portfolio holding information was sourced through an internal database
- Market data
  - Market pricing information was sourced through Yahoo

Internally generated data

	Fiscal Year Ending (12/2016)						Comments
	12/14 Y	12/15 Y	12/16 Y	12/17 Y (E)	12/18 Y (E)	12/19 Y (E)	
Revenues	**302**	**266**	**457**	**945**	**1,431**	**2,084**	
Growth		*-11.8%*	*71.6%*	*107.0%*	*51.4%*	*45.6%*	
Consensus				*949*	*1,533*	*2,209*	
EBITDA	**148**	**109**	**264**	**626**	**993**	**1,484**	
Mgn	*49.1%*	*41.0%*	*57.7%*	*66.3%*	*69.4%*	*71.2%*	
Consensus				*665*	*1,108*	*1,778*	
EBIT	**54**	**(69)**	**30**	**265**	**440**	**733**	
Mgn	*17.9%*	*-26.1%*	*6.5%*	*28.1%*	*30.7%*	*35.2%*	
Inc. Mgn		*345.1%*	*52.0%*	*48.2%*	*35.9%*	*45.0%*	
Growth		*-228.7%*	*-142.9%*	*791.2%*	*65.8%*	*66.8%*	
Consensus				*300*	*532*	*936*	
Other	(6)	47	(10)	(147)	(203)	(309)	*Interest, etc. Should bridge to PBT, What is Ta*
NI	**48**	**(22)**	**20**	**118**	**237**	**425**	
Shares (mm)	*93*	*111*	*162*	*255*	*276*	*276*	
EPS	**$0.38**	**($0.15)**	**$0.11**	**$0.46**	**$0.86**	**$1.54**	
Growth		*-139.8%*	*-170.4%*	*328.6%*	*85.8%*	*79.3%*	
Consensus				*0.48*	*1.11*	*1.82*	
D&A	94	178	234	361	553	751	*If Not EBITDA-EBIT, why?*
Capex	(486)	(402)	(496)	(1,122)	(1,401)	(1,799)	
Other	42	16	(26)	176	150	257	*Other Drivers of Normalized FCF*
FCF	**(301)**	**(230)**	**(268)**	**(467)**	**(461)**	**(366)**	*Normalized FCF*
FCF/Share	*($3.22)*	*($2.07)*	*($1.66)*	*($1.83)*	*($1.67)*	*($1.33)*	
FCF Conversion	*-839%*	*1350%*	*-1535%*	*-396%*	*-195%*	*-86%*	
Dividends	0	0	0	0	0	0	
Share B/B	0	0	0	0	0	0	
Net Debt	627	214	975	1,422	1,883	2,249	
ND/EBITDA	4.2x	2.0x	3.7x	2.3x	1.9x	1.5x	

Market Stats

Price	26.71	20D AVT ($mm)*	154.0
Share Count*	247.6	BB Analyst Rating	4.9
Market Cap*	6,613	SI Days to Cover	3.2
Cash*	503	Next Earnings Date	11/7/2017
Debt*	1,494	BV/Share	8.44
Net Debt*	**992**	Div Yield (%)	0.0%
Ent. Value**	7,605	FCF Yield (%)	-4.0%

*values in millions // **EV includes min. interests

Valuation

	12/17 Y (E)	12/18 Y (E)	12/19 Y (E)	--
P/S	7.0x	4.6x	3.2x	
EV/EBITDA	12.1x	7.7x	5.1x	
EV/EBIT	28.7x	17.3x	10.4x	
P/E	57.8x	31.1x	17.3x	
P/FCF	(14.2)x	(14.4)x	(18.1)x	

Historic Valuation

	1 year	3 year	5 year	10 year
P/S	7.3x	6.8x	5.9x	
EV/EBITDA	11.1x	11.9x	8.4x	
P/E	46.8x	346.5x	32.0x	
P/CF	11.1x	11.7x	9.3x	

Price Target		Price Target Comments	% Δ Tgt.
U/S:	$38.00	7x 2019 EBITDA	42.3%
D/S:	$20.00	6x 2018 EBITDA	-25.1%

Risk Buckets

Other Comments

Data form

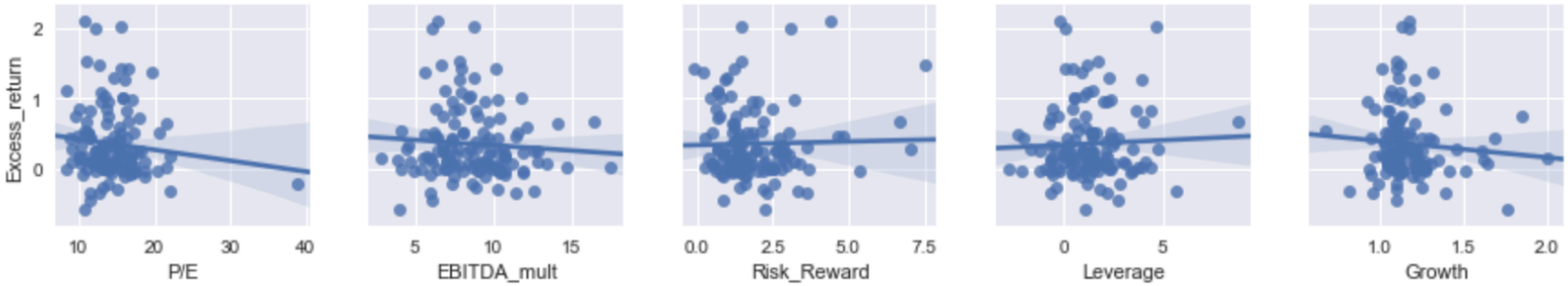
	Tickers	Excess_return	P/E	EBITDA_mult	Risk_Reward	Leverage	Growth
0	AAPL	0.497674	11.208226	5.627996	1.396586	-2.379201	1.106271
1	ABT	-0.041504	13.896665	8.048929	2.200000	-0.223479	1.108157
2	ADP	0.724053	17.830988	10.375587	0.649511	-0.647090	1.114339
3	AEO	-0.037771	12.145503	4.968321	2.000000	-1.223531	1.118048
4	AEP	0.287234	16.031957	8.572424	0.702611	3.510997	1.117882

- Integrating proprietary data, market data and targeting select features returned the following data set for 126 data points

Approach

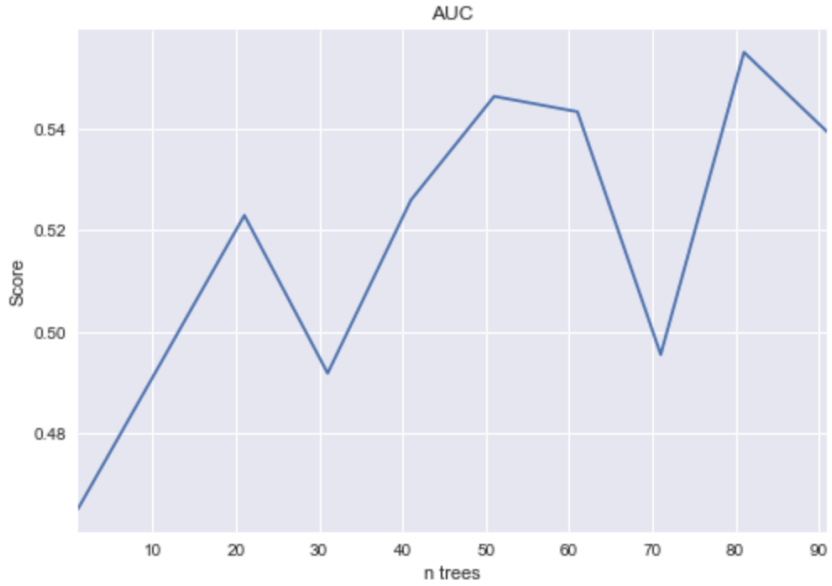
- Linear regression
  - Isolated financial variables that have expected predictive value
  - Performed multi-variable linear regression against variables
- Random forest
  - Applied random forest model
  - Determined importance of variables
  - Estimated AUC scores

Linear regression model was poor



- Regression lines do not show trends
- R^2 for multivariable model is very low at 0.027%

Random forest was little better



	Features	Importance Score
2	Risk_Reward	0.209297
0	P/E	0.206140
3	Leverage	0.204301
4	Growth	0.201093
1	EBITDA_mult	0.179169

- Area under the curve was little better than 0.50, or slightly better than chance

Conclusion

- Features derived from our internal data did not prove predictive of stock returns
- Additional data evaluation is necessary to improve feature predictiveness

"We have long felt that the only value of stock forecasters is to make fortune-tellers look good."

- Warren Buffett

Next steps

- Additional data / features
  - Source 3rd party financial data
  - Implement systematic feature selection
- Better models
  - Evaluated linear regression and random forest
  - Could attempt neural network model
- Integrating time into data evaluation
  - Exercise was static for a point in time
  - Potential to explore variables over time