Data Science Predicts 2023 AMC Profit Margin

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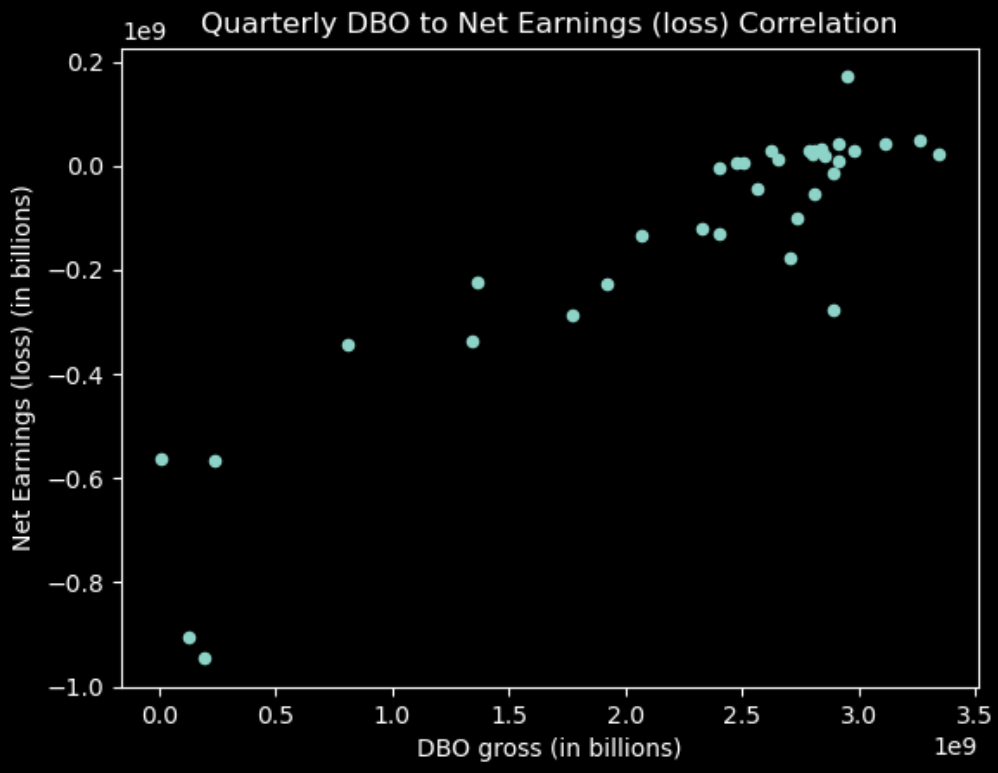
Results: linear regression analysis was used to predict the future AMC earnings from 2023 domestic box office projection. The domestic box office is expected to gross $9B in 2023. Based off the model, and a $9B domestic box office, AMC should earn approximately -578,841,332 dollars in 2023. There is an approximate 68% chance that 2023 earnings will fall within the range of -1,023,877,743 to -133,804,920 dollars. There is an approximate 98% chance that AMC earnings will fall within the broader range -1,468,914,155 to 311,231,491 dollars. As an aside, another model not presented here, but available (see below,) with incredible predictive power predicts that AMC needs approximately $5,643,476,220 in 2023 revenue to be net profitable. The following binomial function predicts quarterly earnings $\hat{y}$ taking quarterly DBO x as it's input:

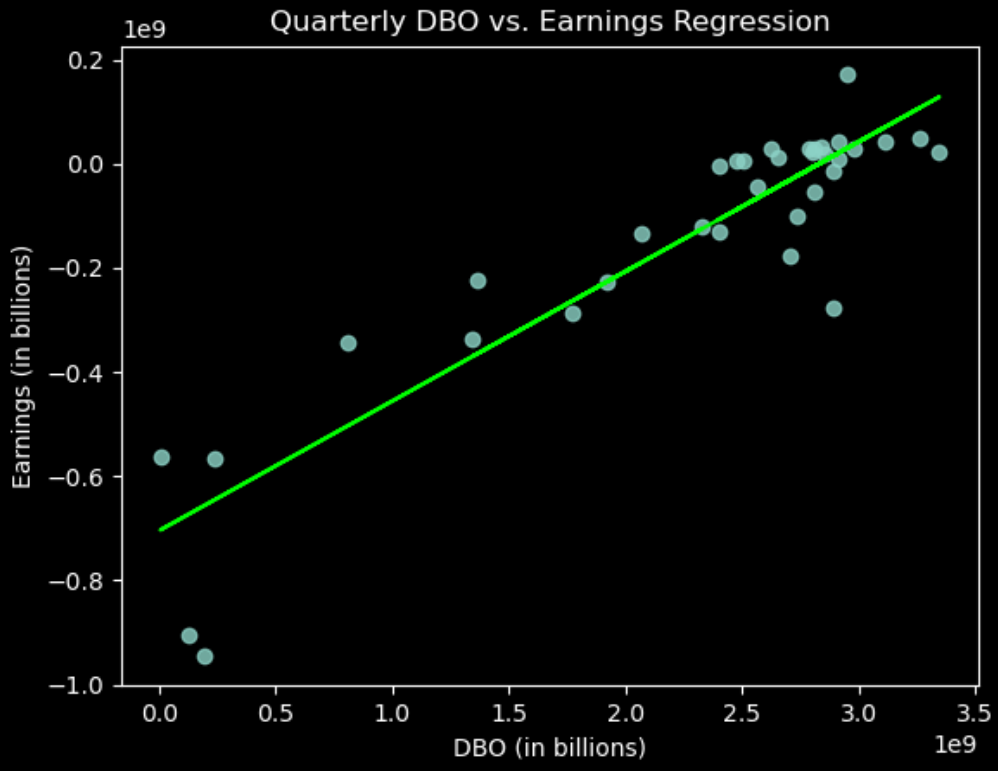
$$\hat{y} = f\langle x\rangle = -704467565.5695393 + 0.24878099226102765 \cdot x$$

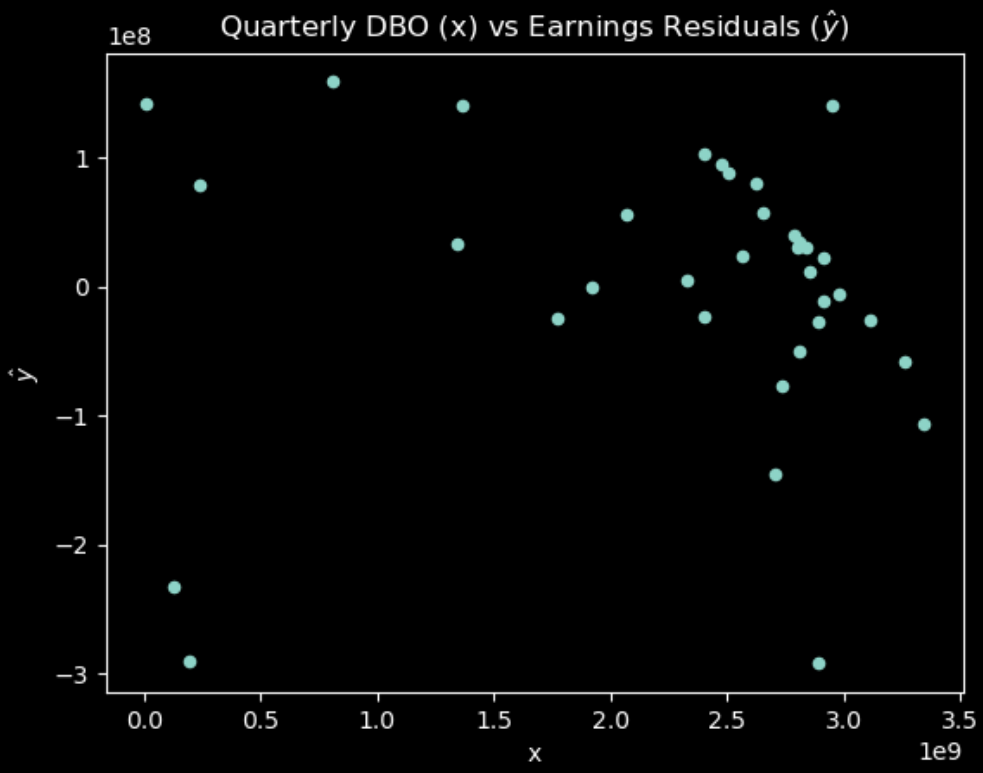
More Predictions: the following table shows predicted yearly earning ranges for AMC based on various possible domestic box office numbers (DBO.) All numbers in the table are in billions of dollars. "rssd" is the residual squares standard deviation σ. Given quarterly earnings $\hat{y} = f\langle x\rangle$ predicted from quarterly DBO x, there is an approximate 68% chance that earnings will fall within $\hat{y} \pm \sigma$. For that same DBO x, there is an approximate 98% chance that earnings will fall within the encompassing broader range of $\hat{y} \pm 2\sigma$. Note that displayed values in the table were adjusted from quarterly to yearly outputs.

DBO ->	-(2 rssd)	-rssd	earnings	+rssd	+(2 rssd)
7.0	-1.97	-1.52	-1.08	-0.63	-0.19
7.5	-1.84	-1.40	-0.95	-0.51	-0.06
8.0	-1.72	-1.27	-0.83	-0.38	0.06
8.5	-1.59	-1.15	-0.70	-0.26	0.19
9.0	-1.47	-1.02	-0.58	-0.13	0.31
9.5	-1.34	-0.90	-0.45	-0.01	0.44
10.0	-1.22	-0.78	-0.33	0.11	0.56
10.5	-1.10	-0.65	-0.21	0.24	0.68
11.0	-0.97	-0.53	-0.08	0.36	0.81
11.5	-0.85	-0.40	0.04	0.49	0.93
12.0	-0.72	-0.28	0.17	0.61	1.06
12.5	-0.60	-0.15	0.29	0.74	1.18
13.0	-0.47	-0.03	0.42	0.86	1.31

About the accuracy of the predictions: A strong correlation between DBO and earnings exists such that Pearsons Correlation Coefficient is ≈ 0.91 with the regression line Coefficient of Determination $r^2 \approx 0.82$. Thus, 82% of the linear relationship ($DBO \rightarrow earnings$) explains earnings. The residual squares standard deviation σ about the least-squares line is 111,259,102.882163 (x4, to convert from quarterly to yearly) compared to the sample standard deviation 259,856,663.12245965 (x4 to convert from quarterly to yearly.) Thus, the regression is a good-fit. The normality test p-value $= 9.25190417852916 \cdot 10^{-9}$. This model has incredibly strong predictive power. Note that the 2020 Q1 outlier was removed from the dataset.


Quarterly DBO to Net Earnings (loss) Correlation
1e9
0.2
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
Net Earnings (loss) (in billions)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
DBO gross (in billions)
1e9


Quarterly DBO vs. Earnings Regression
1e9
0.2
0.0
−0.2
−0.4
−0.6
−0.8
−1.0
Earnings (in billions)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
DBO (in billions)
1e9



Summary about the Research: 4 models were constructed to find the best prediction: 1) predicting earnings from DBO (this model,) 2) predicting revenues from DBO, 3) and then predicting earnings from those predicted revenues, and 4) estimating revenues from yearly average market share of DBO as the proportion of average yearly revenues. Of the 4 models, the one presented is measurably the most accurate for predicting earnings, and consists of the greatest predictive power. Redundant models were used to cross validate the results. The 4th model was also back tested against its historical data. The models, datasets, plots, and this document (in PDF format) can be observed and downloaded from the repository: `github.com/chris-hamberg/fundamentals`

Data Sources:

`investor.amctheatres.com/financial-performance/`
`boxofficemojo.com/`
`the-numbers.com/market/`