AMC Entertainment Holdings Inc Options Price

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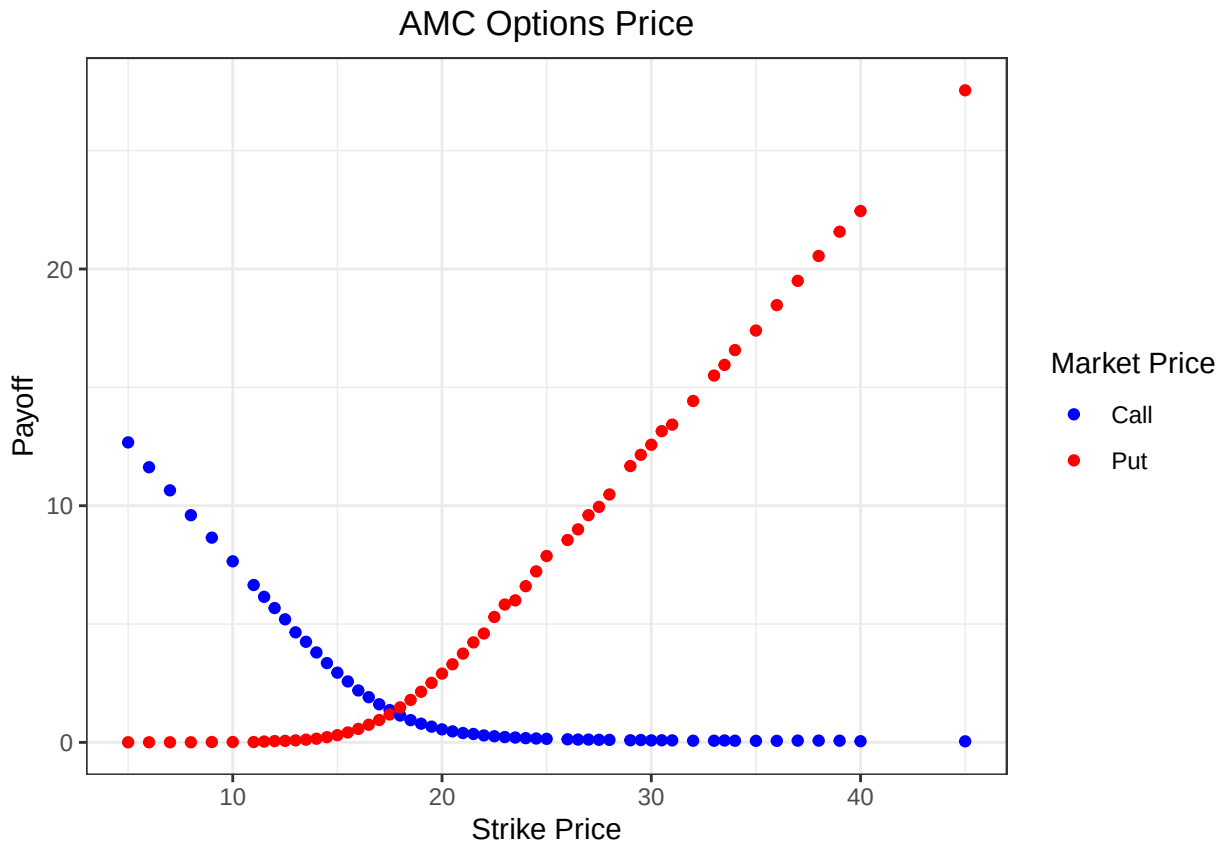
Q1: Get Options Data

We used options data from NYSE's AMC Entertainment Holdings Inc with expiration date March 04 2022.

Table 1: Sample of a few rows of the cleaned data

	Market Price	
Strike	Call	Put
5.0	12.675	0.005
6.0	11.625	0.005
7.0	10.650	0.005
8.0	9.600	0.005
9.0	8.650	0.015
10.0	7.650	0.015
11.0	6.650	0.015
11.5	6.150	0.035
12.0	5.675	0.055
12.5	5.200	0.065
13.0	4.650	0.085
13.5	4.250	0.115
14.0	3.800	0.155
14.5	3.350	0.220
15.0	2.945	0.305
15.5	2.575	0.420
16.0	2.195	0.570
16.5	1.910	0.745
17.0	1.610	0.945
17.5	1.365	1.180

Q2: Plot Put and Call Options Vs Strike Price



Q3: Fit a Multiple Linear Regression Model and Estimate All Parameters

Results of the model are as follows:

```
##
## Call:
## lm(formula = Call ~ Put + Strike, data = market_prices)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.31242 -0.01398  0.01367  0.04093  0.12056
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 17.641607   0.057446   307.1   <2e-16 ***
## Put          0.996657   0.005328   187.1   <2e-16 ***
## Strike      -1.001114   0.004070  -246.0   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08148 on 53 degrees of freedom
## Multiple R-squared:  0.9994, Adjusted R-squared:  0.9994
```

```
## F-statistic: 4.588e+04 on 2 and 53 DF,  p-value: < 2.2e-16
```

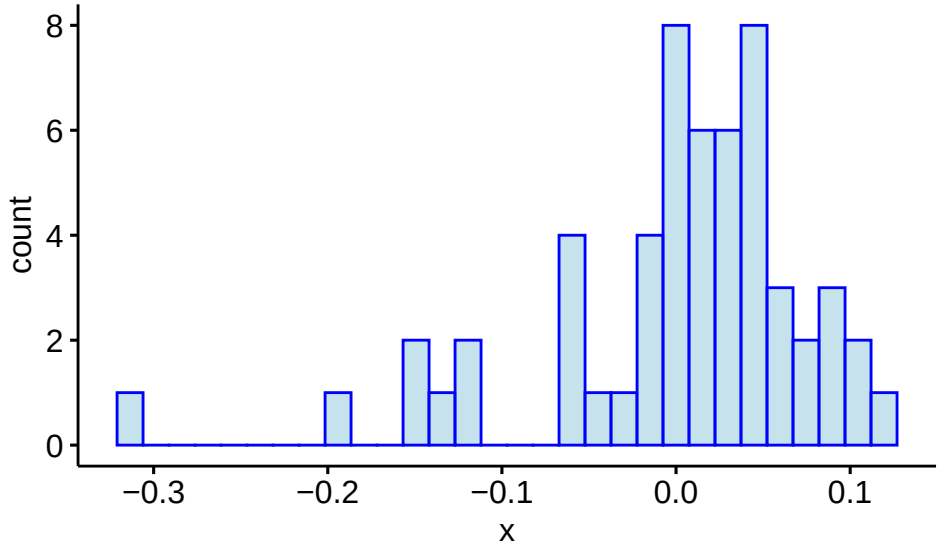
The estimated parameters are:

- $\beta_0 = 17.641607$
- $\beta_1 = 0.996657$
- $\beta_2 = -1.001114$

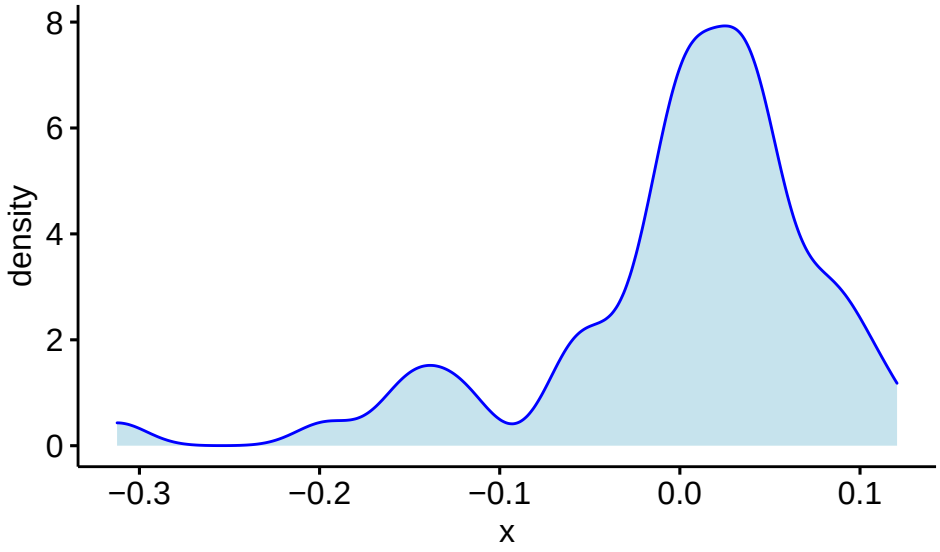
Check If Assumption Of Normality Over Residuals Is Valid

A graphical analysis of the residuals:

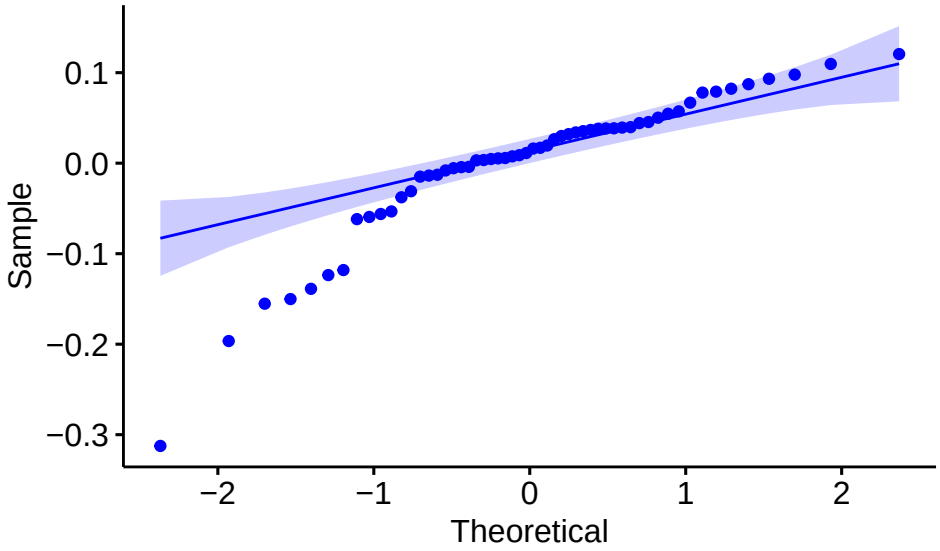
- A histogram of the residuals shows that most of the residuals are clustered around 0 (which is their mean theoretically) but there are some clustered around -0.13. Chances are the errors may not be normally distributed.



- A density plot of the residuals looks more of bimodal distribution:



- A qqplot of the residuals shows that majority of the points don't fall along the reference line, so we cannot assume normality:



Formal Test For Normality

We used the `Shapiro-Wilk Test` for normality:

```
##
##  Shapiro-Wilk normality test
##
## data:  error
## W = 0.87022, p-value = 2.292e-05
```

`p-value < 0.05` implying that the distribution of the errors is significantly different from the normal distribution, hence we cannot assume normality.