

PREDICTING PRICES OF LOOSE DIAMONDS

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PHOTO BY LEAH KELLEY FROM PEXELS

GOALS

To explore the relationship between the physical properties of loose diamonds and diamond prices

Can we build a highly predictive linear regression model?

Apply the model to loose diamond data obtained from a different source

Can this model predict consistently across a different dataset?



DATA



BLUENILE.COM

RETAILER



52,372 SAMPLES
\$500 - \$13,000
ROUND
GIA GRADED
11 FEATURES

DATA



BRILLIANCE.COM

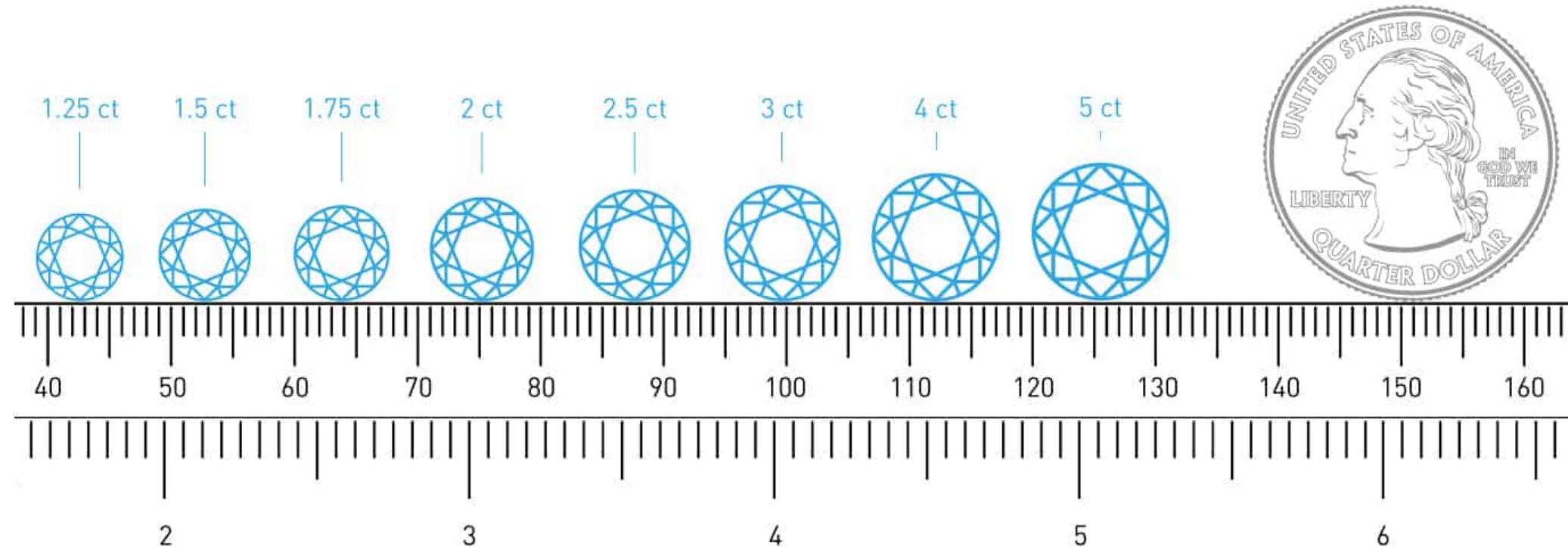
WHOLESALER



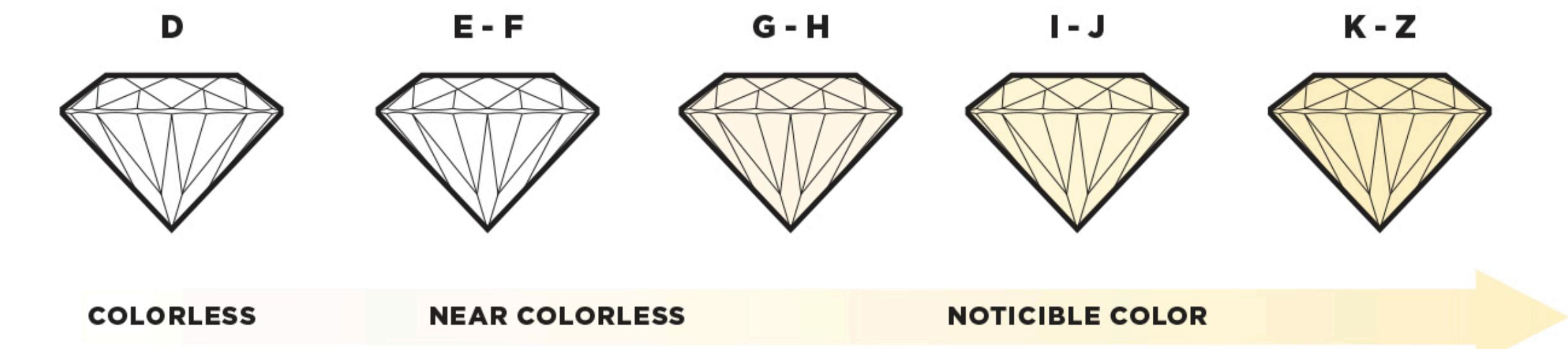
21,782 SAMPLES
\$500 - \$13,000
ROUND
GIA GRADED
11 FEATURES

DATA

CARAT WEIGHT



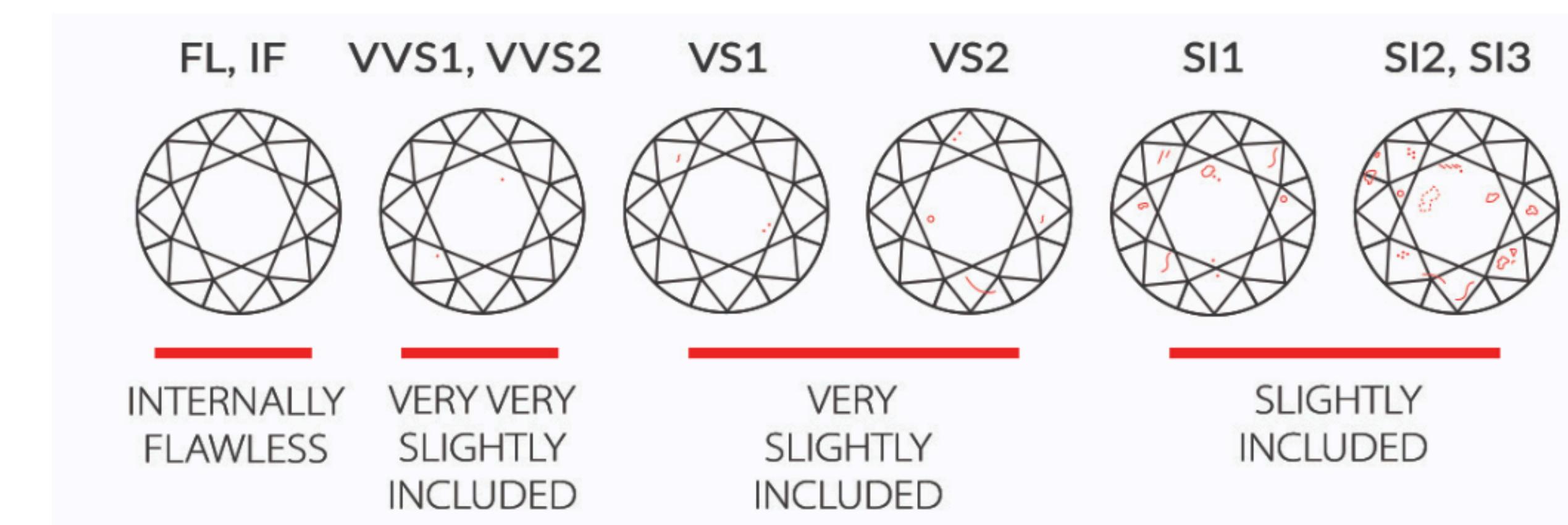
COLOR



CUT



CLARITY



HYPOTHESIS



BLUENILE.COM

RETAILER



BRILLIANCE.COM

WHOLESALE

“
~~In Store Price: \$3,452~~
Our Price: \$2,301

“
~~In Store Price: \$12,000~~
Our Price: \$8,000

The Blue Nile model will consistently 'over-guess' the price for the Brilliance diamonds

METHODS

LINEAR REGRESSION WITH MULTIPLE FEATURES FOR BASELINE

**FIT TO BLUE NILE TRAINING DATA
APPLY TO BLUE NILE VALIDATION DATA
KEEP TEST DATA TO THE SIDE**

TRAINING R-SQUARED: 0.8777...

VALIDATION R-SQUARED: 0.8776...

TRAINING RMAE: \$957.377...

VALIDATION RMAE: \$956.937...

METHODS

FINAL MODEL

CUSTOM FEATURE INTERACTIONS

SKLEARN.PREPROCESSING POLYNOMIALFEATURES

SKLEARN.PREPROCESSING STANDARDSCALER

LASSO REGRESSION

FIT ON BLUE NILE TRAIN + VALIDATION DATA

APPLY MODEL TO BLUE NILE TEST DATA

APPLY MODEL TO BRILLIANCE DATA

FINDINGS

BLUE NILE VALIDATION R-SQUARED: 0.8776...

BLUE NILE VALIDATION RMAE: \$956.937...

BLUE NILE TEST R2: 0.956...

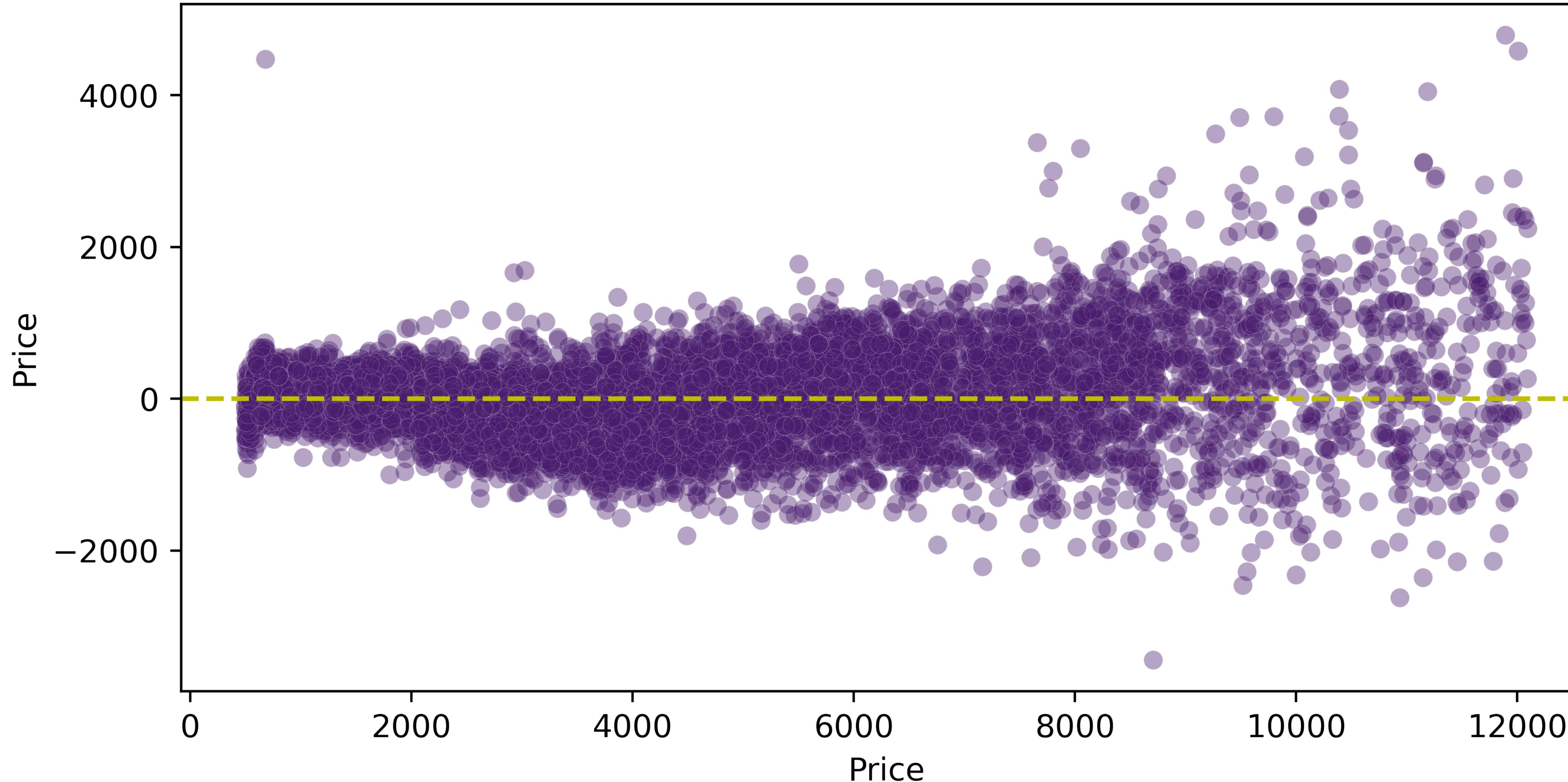
BLUE NILE TEST RMSE: \$564.249....



FINDINGS



BlueNile.com Price Residuals



FINDINGS

BLUE NILE VALIDATION R-SQUARED: 0.8776...

BLUE NILE VALIDATION RMAE: \$956.937...

BRILLIANCE R2: 0.8711...

BLUE NILE TEST R2: 0.956...

BRILLIANCE RMSE: \$1003.682...

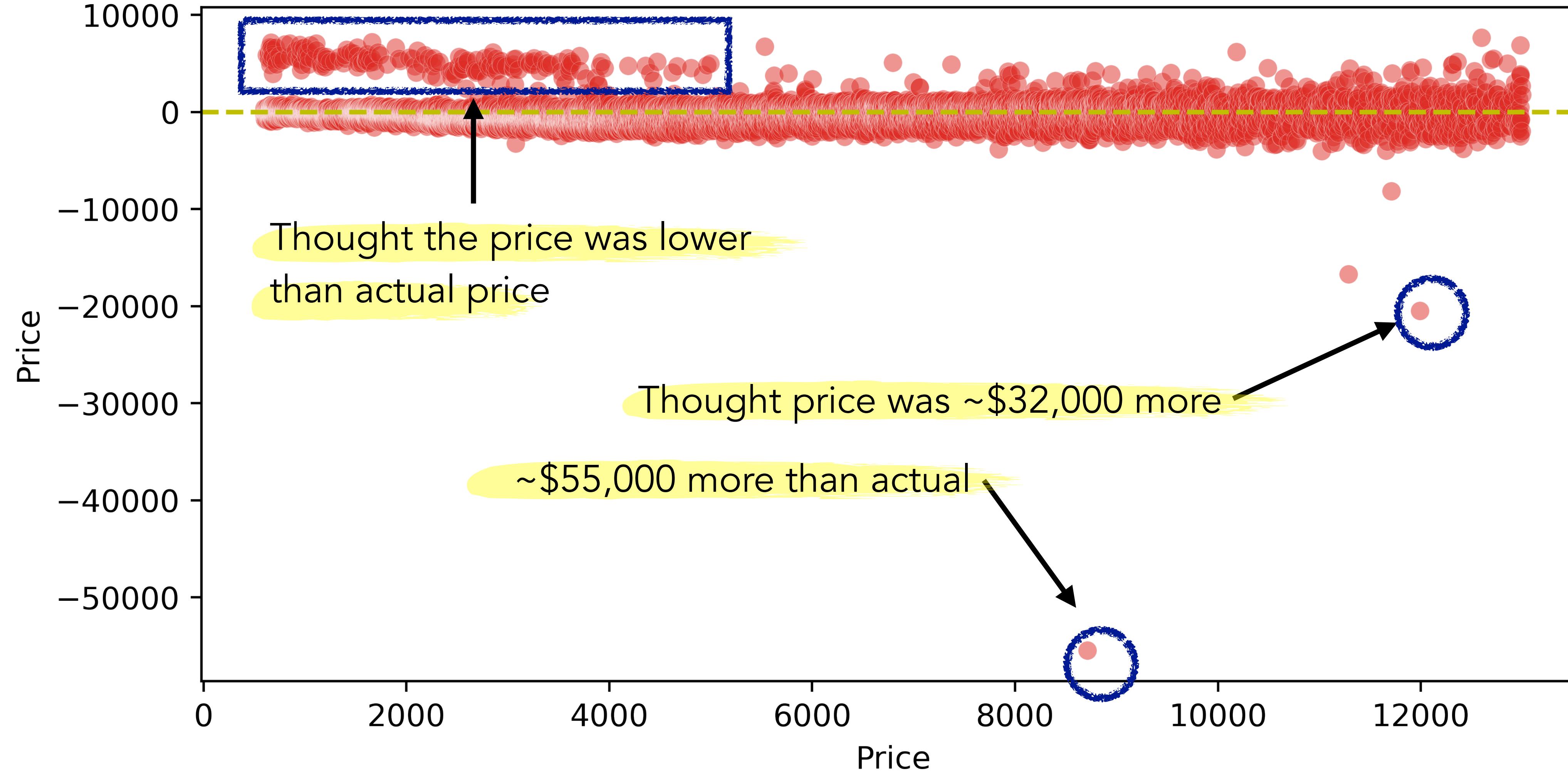
BLUE NILE TEST RMSE: \$564.249....



FINDINGS



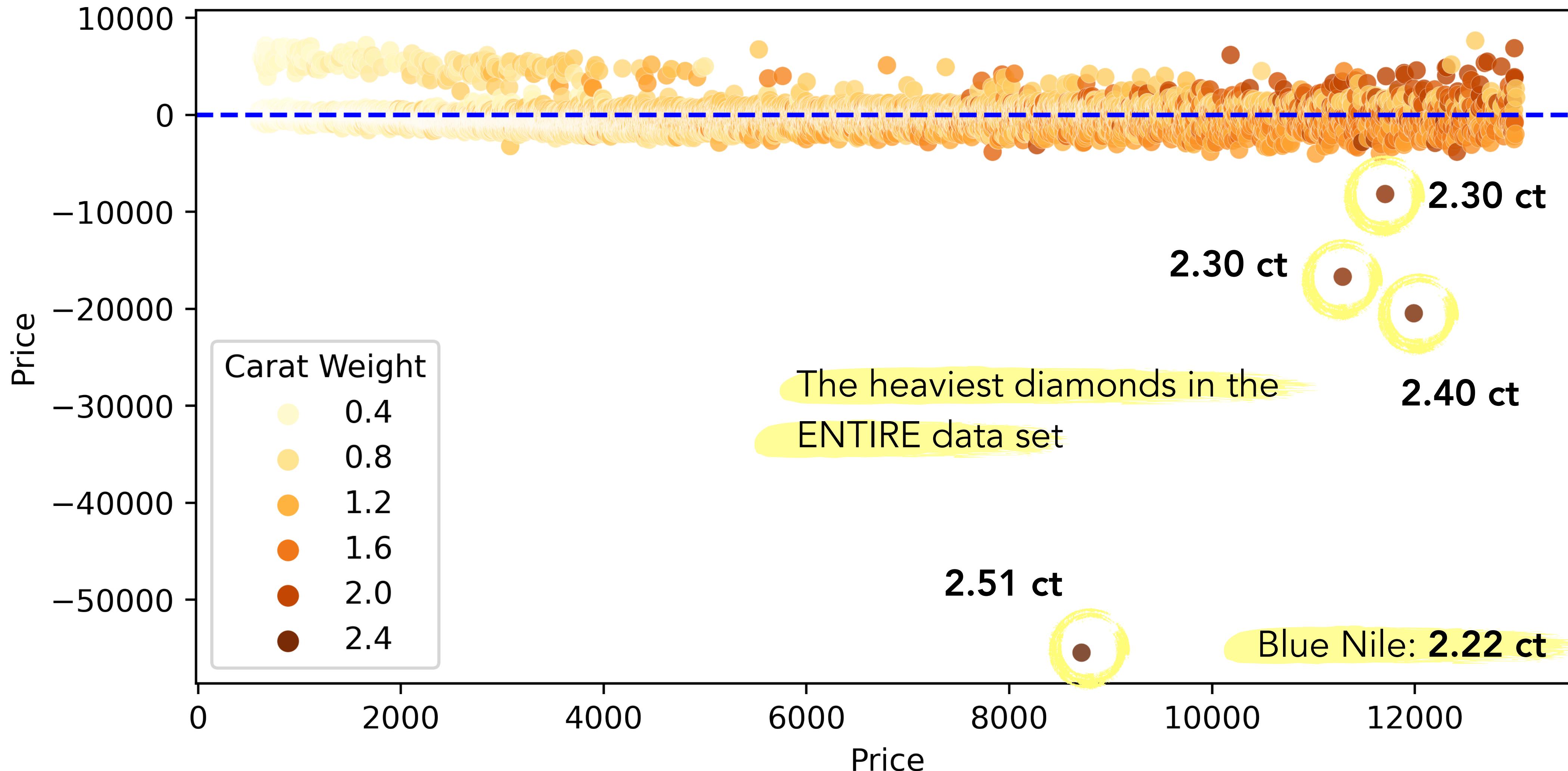
Brilliance.com Price Residuals



FINDINGS



Brilliance.com Price Residuals (Against Carat Weight)



CONCLUSION

Yes, we can create a highly predictive linear regression model for loose diamonds.

Yes, our model can predict fairly consistently across a completely different data set.

No, Brilliance diamonds are not a better deal



FURTHER STUDIES...

Collect more data across a wider range of prices for Blue Nile and Brilliance

Use model on additional diamond distributors to continue to test hypothesis

Try out other models like XGBoost

