Predicting costs :: Part 2

Planning and Regional Development

11/26/2019

1. Summary

Large projects - defined as the biggest 20 percent of 239 projects evaluated in Part 1 — and ones subjected to closed bidding processes explain a significant degree of the inaccuracy observed in agency cost estimation. Part 2 searches for predictive factors from within those two project subpopulations. It also considers the relationship between accuracy and the number of bidders, which was generally omitted from Part 1 as internal estimators do not know how many bidders will respond as they develop estimates.

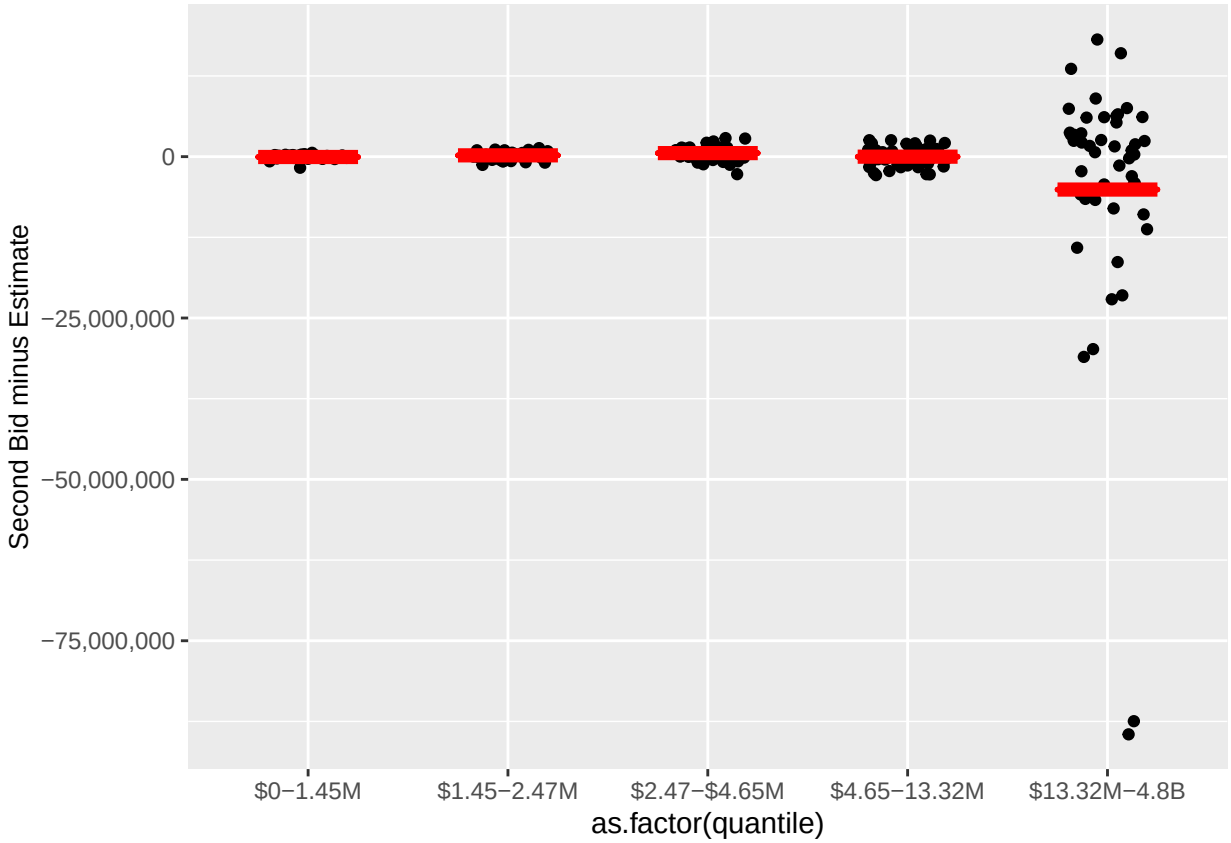
The agency's internal cost estimates predict 95 percent of variation in cost, using the second-lowest bid[1] as a predicting target. Yet on an absolute basis[2], however, the gap between internal estimate and second-lowest bid averages $2.7 million, or 18 percent of the average project size. Reducing this gap would provide for stronger confidence in long-range capital capacity estimates and could reduce the need for project-level change orders.

[1]The agency's internal regulations require, in all but a handful of cases, the acceptance of the lowest bid. The Engineering Department views the second-lowest bid as a better predictive target.

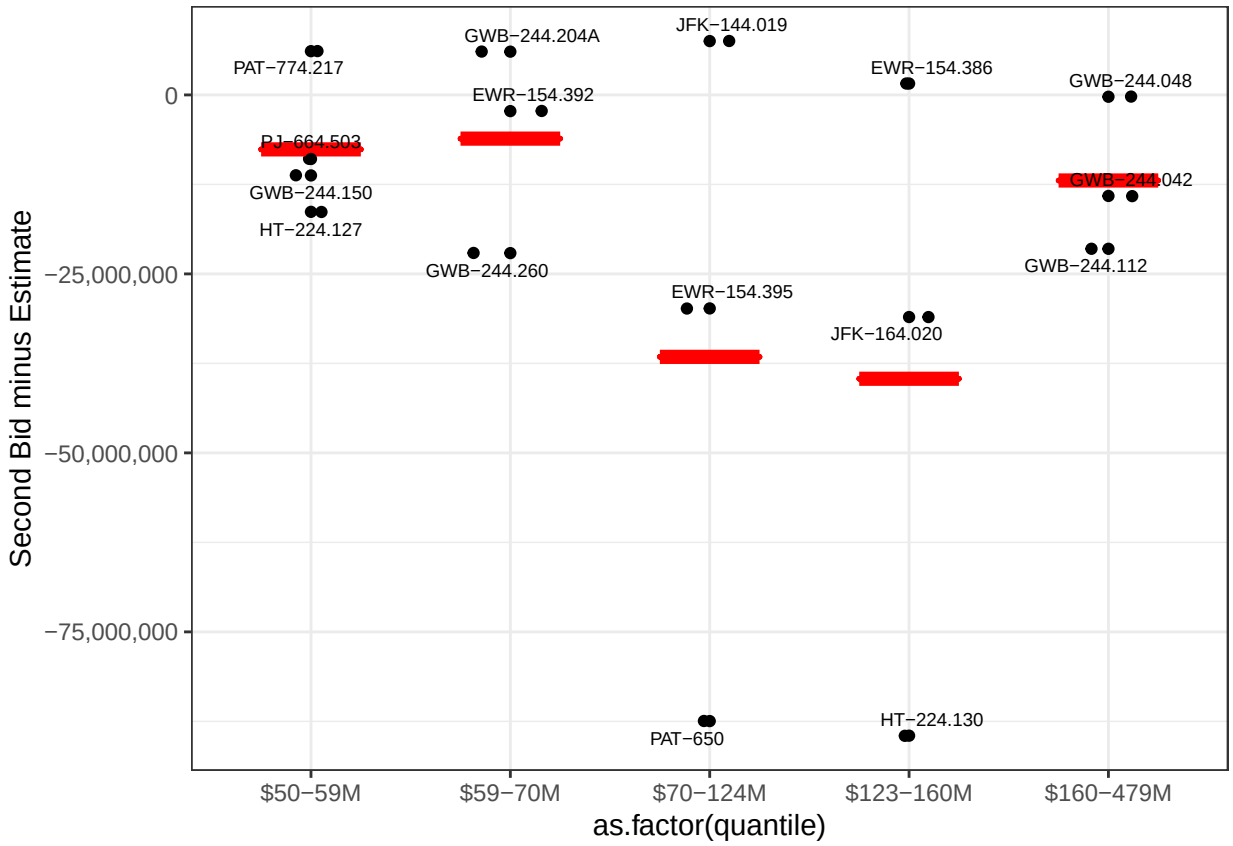
[2]Mean absolute error, MAE.

2. Motivation

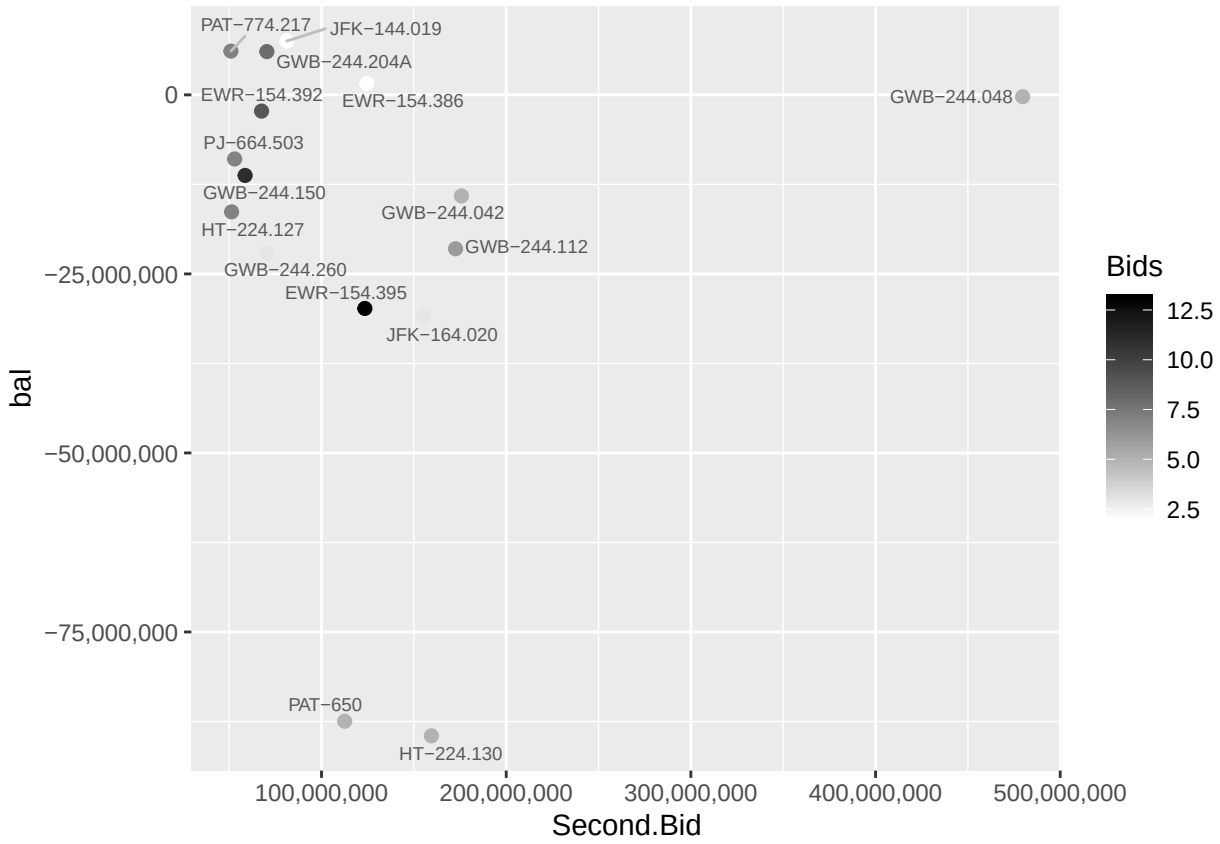
Project size (dollars bid)




```
bids.big = subset(bids, bids$Second.Bid >= 5e+07)
```




```
options(scipen = 999)
ggplot(bids.big, aes(x = Second.Bid, y = bal, color = Bids)) + scale_colour_gradient(low = "white",
    high = "black") + geom_point(size = 2) + scale_y_continuous(label = comma) +
    scale_x_continuous(label = comma) + ggrepel::geom_text_repel(aes(label = Proj),
    color = "grey35", size = 2.5, segment.color = "grey")
```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EWR−154.392
EWR−154.386
GWB−244.048
PJ−664.503
GWB−244.150
GWB−244.042
HT−224.127
GWB−244.112
GWB−244.260
EWR−154.395
JFK−164.020
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bal
100,000,000
200,000,000
300,000,000
400,000,000
500,000,000
Second.Bid
Bids
12.5
10.0
7.5
5.0
2.5