Gasbarro Capstone Project: Data Story - FINAL VERSION

January 23, 2019

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Introduction

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A years ago, our company created an entire working group devoted to developing a professional expertise and sophisticated software products for customers in the Energy & Engineering sector. The decision to form this group was based on the fact that a significant number of our customers were in these business sectors, and were trying to use our software to accomplish industry-specific goals and practices.

The big question we want to know is: How are we doing? This big question can be broken down into smaller targeted questions.

- How many Energy and Engineering customers have we WON, as opposed to LOST?
- Are there more WON opportunities, year after year, as opposed to LOST?
- Are we winning more Energy and Engineering opportunities over time? And how do E&E sectors compare with wins for customers in other leading sectors (like Financial)?
- Are we winning more money in each deal closed for Energy and Engineering accounts over time? Is the amount of money Energy and Engineering group seem to be making (based on won deals) in alignment with other business sectors groups?

The following sections and charts should answer these questions, and should give us a good picture of how are Energy & Engineering business development is doing.

Summary: Won vs. Lost

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How many Energy and Engineering customers have we WON, as opposed to LOST?

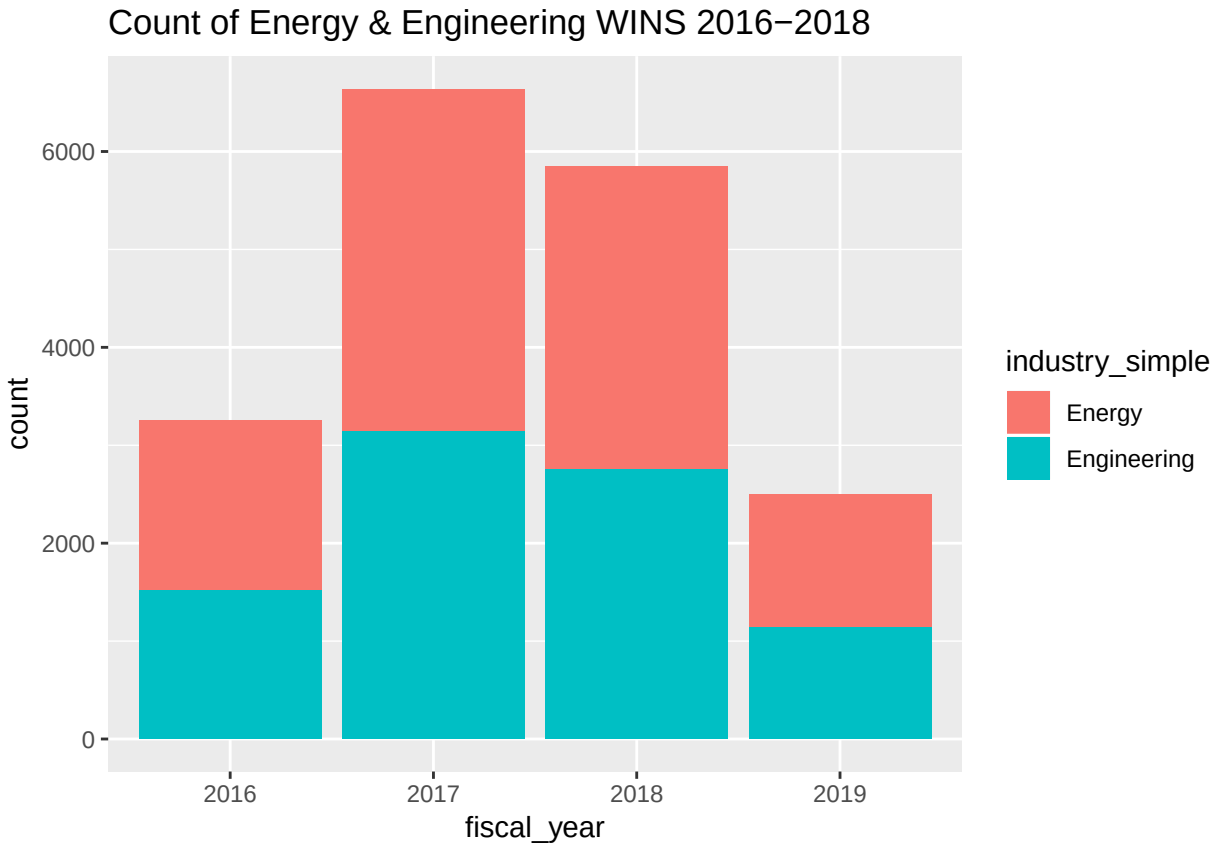
The following table shows a summary of the deals WON, grouped by each industry.

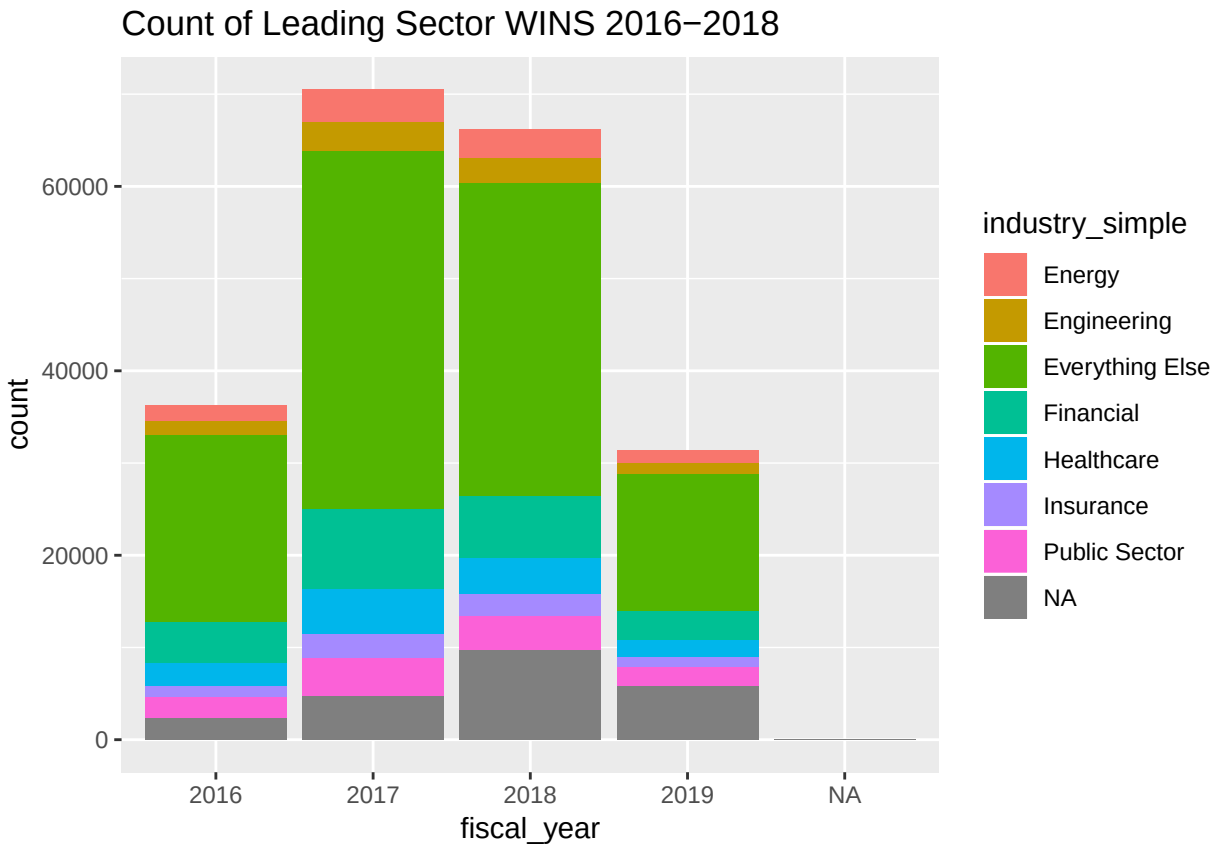
```
## # A tibble: 8 x 7
##   industry_simple countWon     sumWon meanWon medianWon     maxWon   minWon
##   <chr>              <int>      <dbl>   <dbl>     <dbl>      <dbl>    <dbl>
## 1 Energy              3811     3.84e8 100648.    13987.  33687033.  -5.13e5
## 2 Engineering         3781     1.88e8  49779.     2832.  11800000   -1.71e4
## 3 Everything Else    50986     2.44e9  47834.     2771. 521876775   -3.21e6
## 4 Financial           9308     8.04e8  86393.     6900.  98687619.  -5.34e5
## 5 Healthcare          5873     2.43e8  41381.     4471.   7031146.  -1.53e5
## 6 Insurance           3054     2.33e8  76388.    11700    6625000   -1.01e5
## 7 Public Sector       4337     2.49e8  57432.     6400   10017734.  -8.75e4
## 8 <NA>               14858    NA          NA        NA         NA   NA
```

The first bar chart, based on the summary table, shows the number of WON deals for the Energy and Engineering sectors, treated separately, for 2016, 2017, and 2018.

The second chart shows that the Energy and Engineering industries, when grouped together, have a significant amount of deals, compared with other business sectors (like Financial, Insurance, and Healthcare)

Across all industries, there is a dip in # of opportunities from 2017 to 2018, but it statistically small, and reflects a significant business event that occurred in 2017. (See Conclusion.)




Count of Leading Sector WINS 2016−2018
count
60000
40000
20000
0
2016
2017
2018
2019
NA
fiscal_year
industry_simple
Energy
Engineering
Everything Else
Financial
Healthcare
Insurance
Public Sector
NA

WON vs. LOST by YEAR

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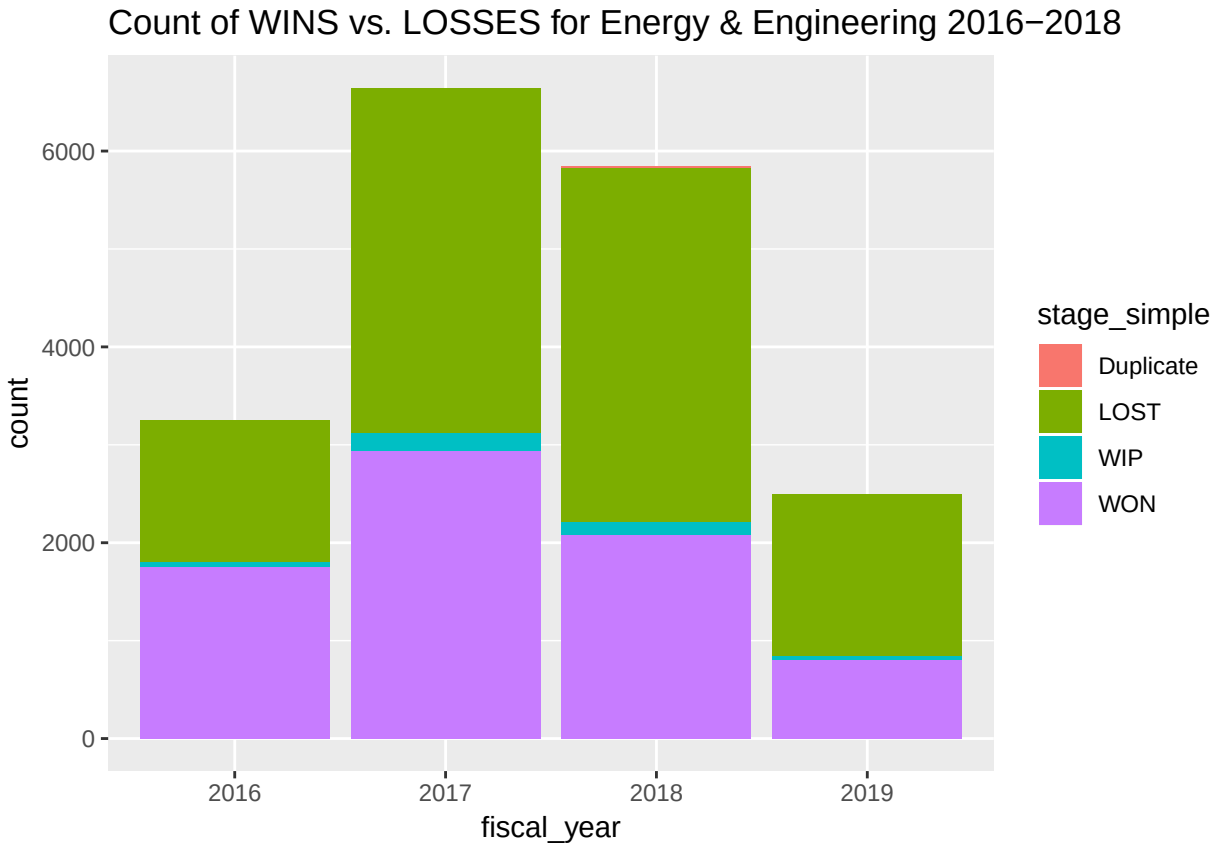
Are there more WON opportunities, year after year, as opposed to LOST?

The following chart filters all the opportunities into a subset focused on the Energy and Engineering sectors, and looks at the amounts that were WON vs. LOST.

The proportion of WON vs. LOST opportunities appears to remain the same over the last 3 years, whether the total amount of opportunities rises and falls.

There is a slight dip from 2017 to 2018, but this can be explained by business events that occurred in 2018 (see Conclusion section).



More WON Deals Over Time?

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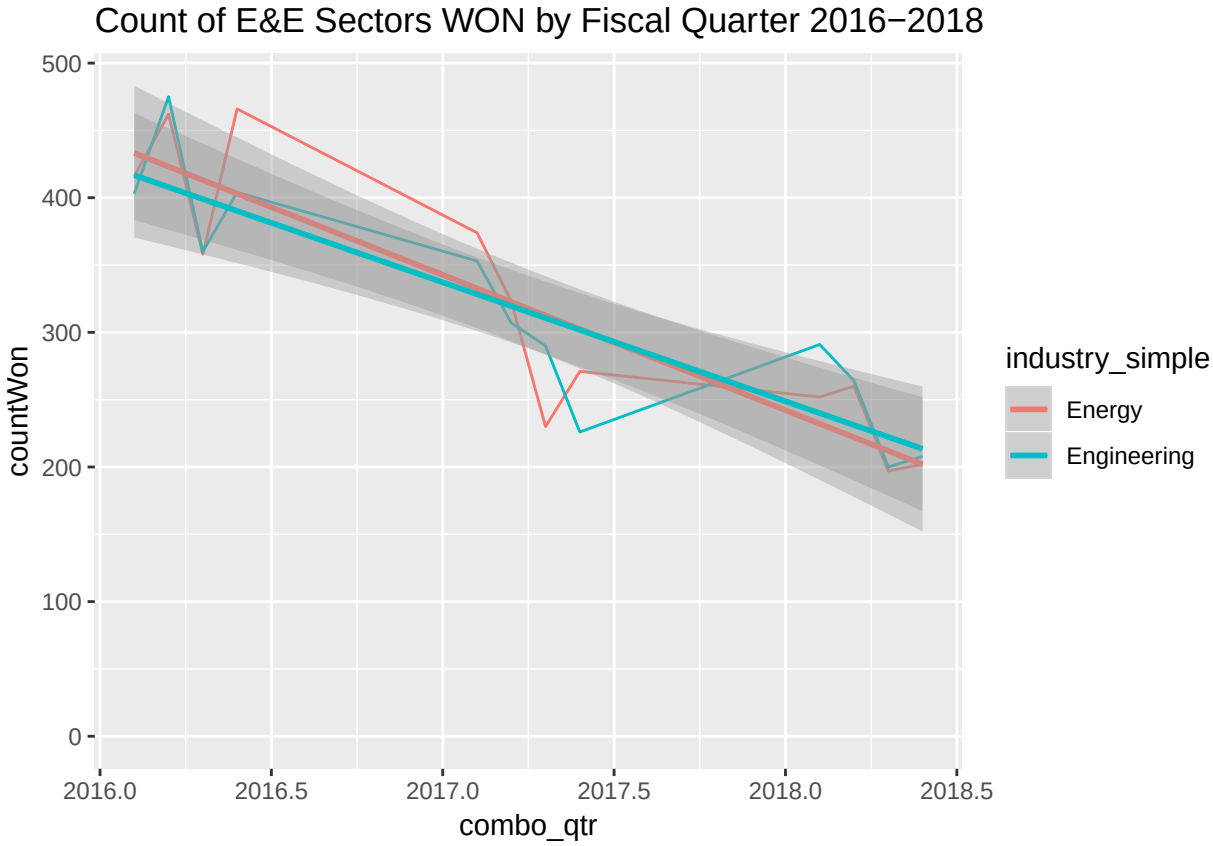
Are we winning more Energy and Engineering opportunities over time? And how do E&E sectors compare with wins for customers in other leading sectors (like Financial)?

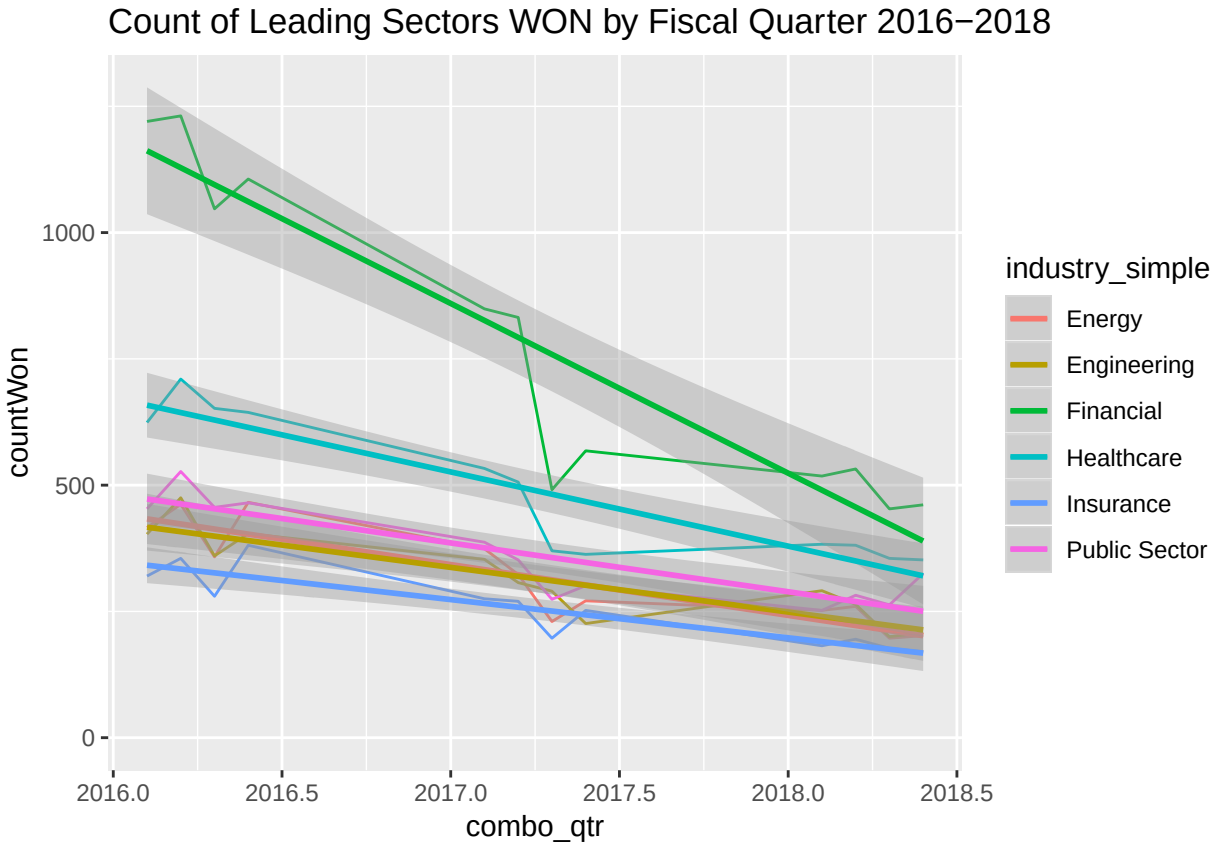
The bar chart in in WON vs. LOST by YEAR shows the number of WON opportunities appears to increased from 2016 to 2017, then decrease into 2017. However, the bar chart doesn't give us a good picture of how this is happening over time (e.g. days or months)

We created two new variables - combo_date and combo_quarter - which represent the Year and Financial Quarter of the Close Date as a numerical value (2016.4) which can be easily mapped onto a GGPLOT chart.

We also excluded "Everything Else" from the chart results, because it skewed the results (since "Everything Else" is a catch-all for every other business sector).

The first chart shows the trend of Number (Count) of deals WON in Energy and Engineering from 2016 to 2018. The second chart shows the same trend, but across the leading industries (like Financal) compared with E&E sectors.




Count of Leading Sectors WON by Fiscal Quarter 2016−2018
countWon
1000
500
0
2016.0
2016.5
2017.0
2017.5
2018.0
2018.5
combo_qtr
industry_simple
Energy
Engineering
Financial
Healthcare
Insurance
Public Sector

More MONERY per DEAL Over Time?

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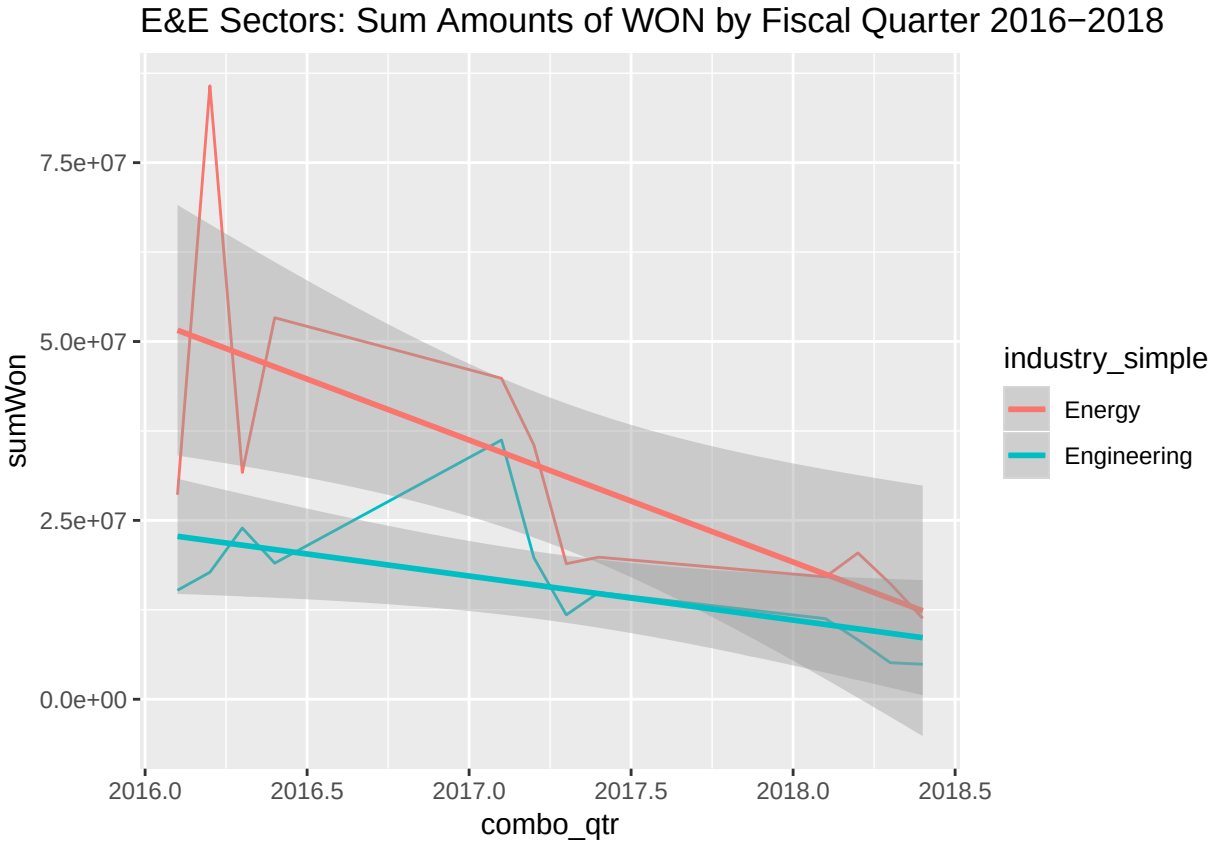
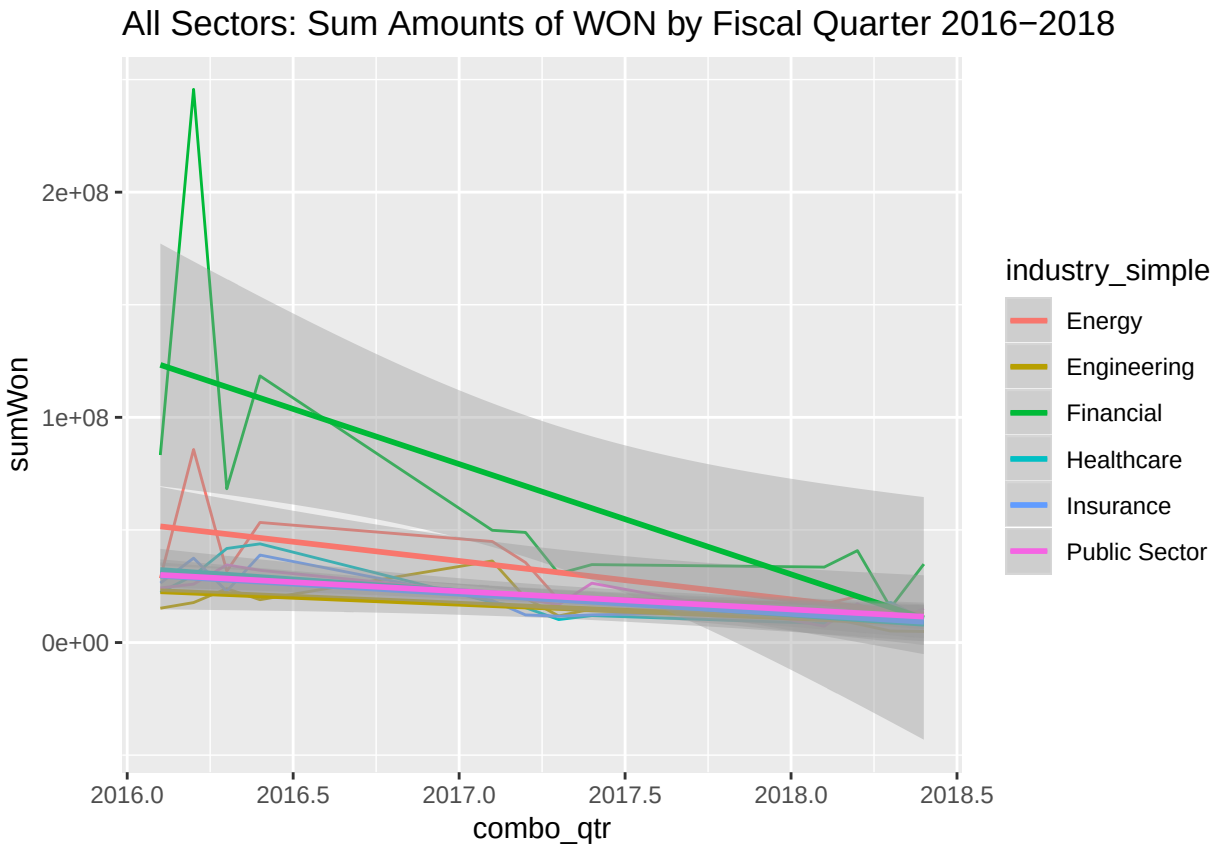
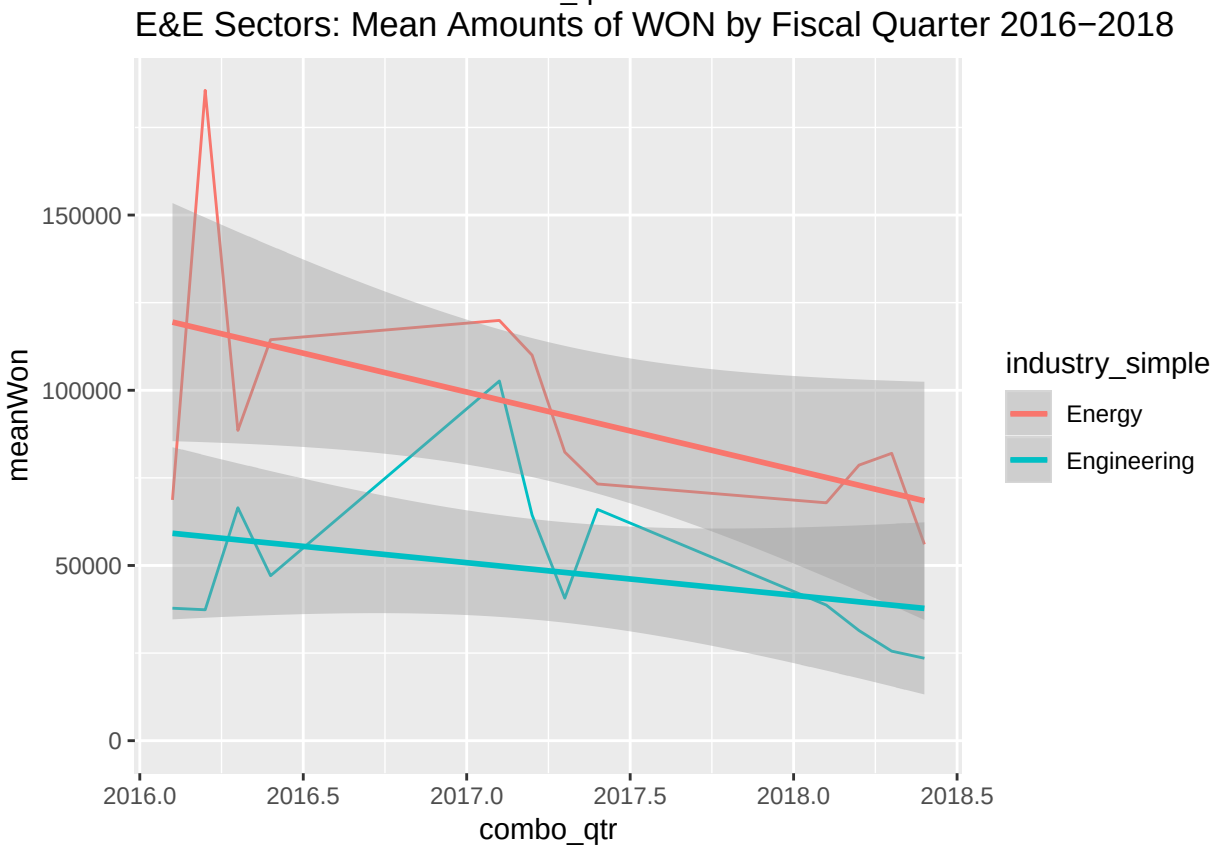
Are we winning more money in each deal closed for Energy and Engineering accounts over time?

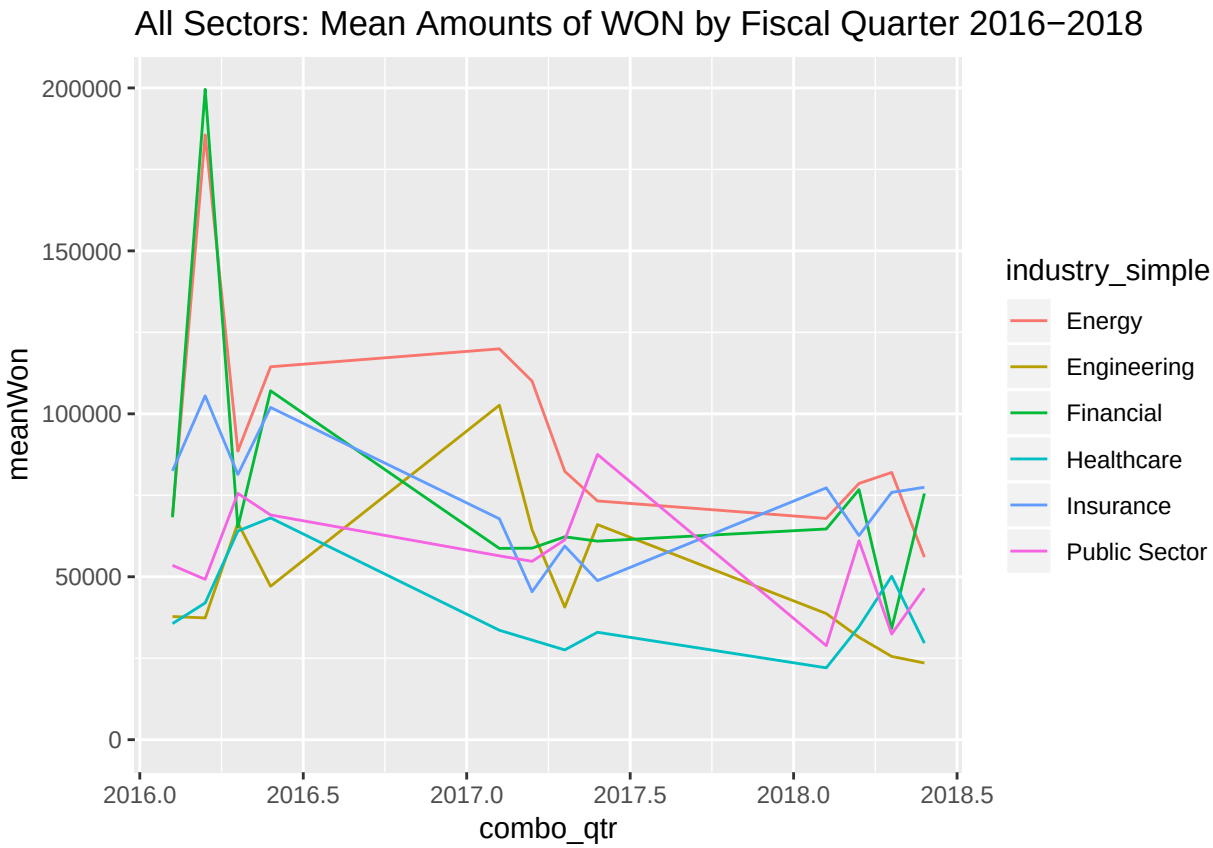
The first pair of charts shows the SUM amount of money, across all deals, tracked over time by business sector. All industries saw a decline in the total amount of Expected Revenue from 2016 to 2018, though the decline was modest.

The second pair of charts shows the MEAN amount of money per deal, tracked over time by business sector. Again, all sectors saw a decline in the MEAN amount per deal, but the Energy sector saw the most precipitous drop from 2016 to 2018 among all the sectors.




All Sectors: Sum Amounts of WON by Fiscal Quarter 2016−2018
sumWon
2e+08
1e+08
0e+00
2016.0
2016.5
2017.0
2017.5
2018.0
2018.5
combo_qtr
industry_simple
Energy
Engineering
Financial
Healthcare
Insurance
Public Sector


E&E Sectors: Mean Amounts of WON by Fiscal Quarter 2016−2018
meanWon
150000
100000
50000
0
2016.0
2016.5
2017.0
2017.5
2018.0
2018.5
combo_qtr
industry_simple
Energy
Engineering


All Sectors: Mean Amounts of WON by Fiscal Quarter 2016−2018
meanWon
200000
150000
100000
50000
0
2016.0
2016.5
2017.0
2017.5
2018.0
2018.5
combo_qtr
industry_simple
Energy
Engineering
Financial
Healthcare
Insurance
Public Sector

Expected Revenue by Industry

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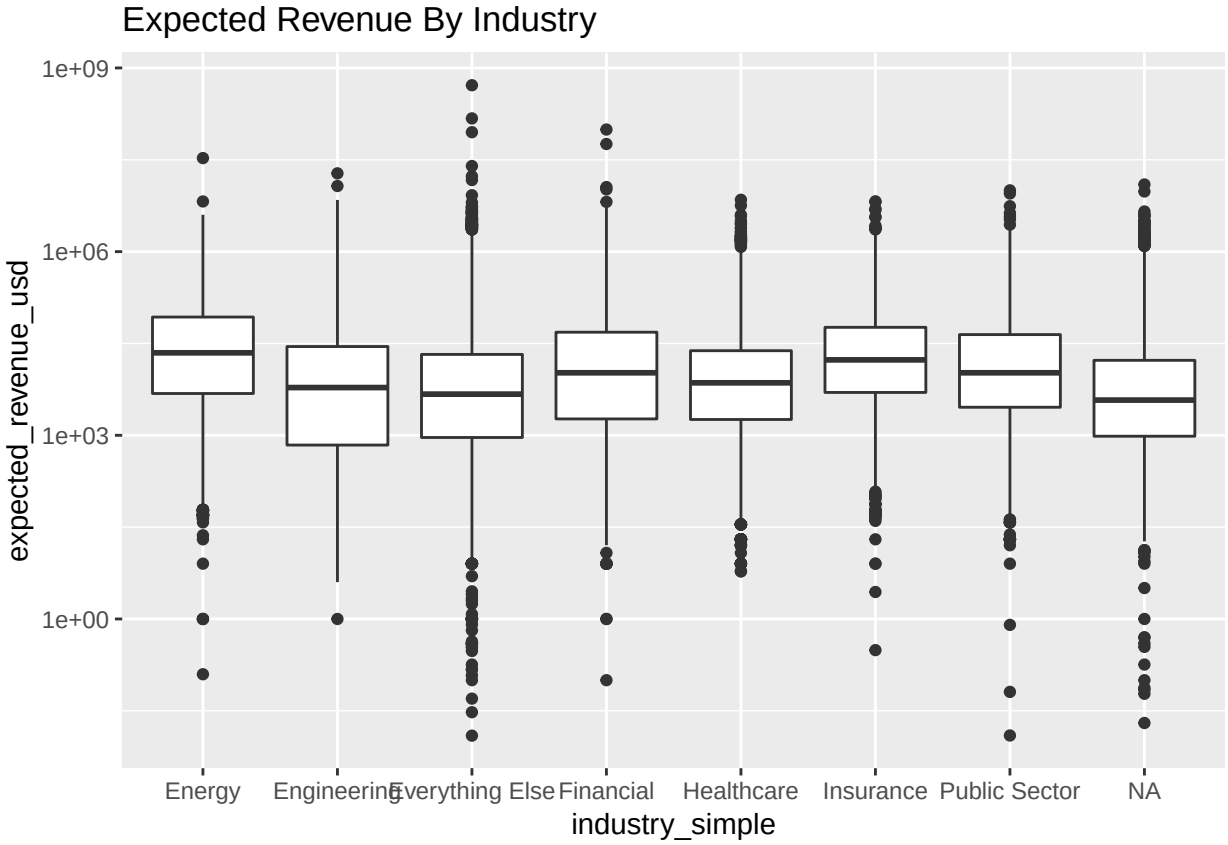
Is the amount of money Energy and Engineering group seem to be making (based on won deals) in alignment with other business sectors groups?

The following chart appears to show the following for each Industry: - black line is the MEDIAN - top is 75th percentile - bottom is 25th percentile - the "whiskers" represent the additional range of values - the dots represent the outliers

The graph seems to show that the Energy industry ranges are in alignment with the median and distributions for other industries, even if overall counts of WINS and AMOUNTS declined from 2017 to 2018.

```
## # A tibble: 8 x 6
##   industry_simple      sumWon meanWon medianWon     maxWon    minWon
##   <chr>                 <dbl>   <dbl>     <dbl>      <dbl>     <dbl>
## 1 Energy           383570483. 100648.    13987.  33687033.  -512975
## 2 Engineering      188213736.  49779.     2832.  11800000    -17126.
## 3 Everything Else 2438855514.  47834.     2771. 521876775  -3214097
## 4 Financial        804142703.  86393.     6900.  98687619.  -533829.
## 5 Healthcare       243028952.  41381.     4471.   7031146.  -152562.
## 6 Insurance        233290438.  76388.    11700    6625000   -100685
## 7 Public Sector    249084068.  57432.     6400   10017734.   -87500
## 8 <NA>                    NA      NA       NA         NA        NA
```



Conclusion

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We can draw the following conclusions based on the previous charts.

1. Acquisition. Some of the cuase for the the sharp rise and fall between 2016 and 2018 can be attributed to a significant event: the acquisition of another company (with a significant business opportunity pipeline) by our company. The acquired company brought its own opportunities, which greatly increased the overall number in 2017.

- The 2017 number represents 2 companies merging together their opportunities, wins and losses.
- The 2016 and 2018 numbers represent opportunities for a single company.

Unfortunately, there is variable or data point in the dataset that identifies Company A deals and Company B deals in 2017. With more time (another year or two), it will be possible to better assess the overall direction of Energy and Engineering sales.

2. Sector Comparison. Overall, the Energy and Engineering sectors represent significant proprotions of our business pipeline. While they are not the biggest sector (like Financial customers), they reflect heavily invested customer sector which we should continue to invest business development and product development resources.

3. Mean Amount. The decline of the average amounts spent by customers for Energy deals is concerning, but not alarming or unexpected. Over time, many existing customers (and some newer ones) are looking to leverage their existing technologies for lower project costs. Many of our customers have asked about using offshore resources in India and China, allowing them to buy the same amount of product or services for less cost. However, this trend should be monitored: ideally, it should flatten in the coming years, and not decline precipitously.