



DDC Project Data Analysis

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Project 2 Task 1

Initial Dependent Variables

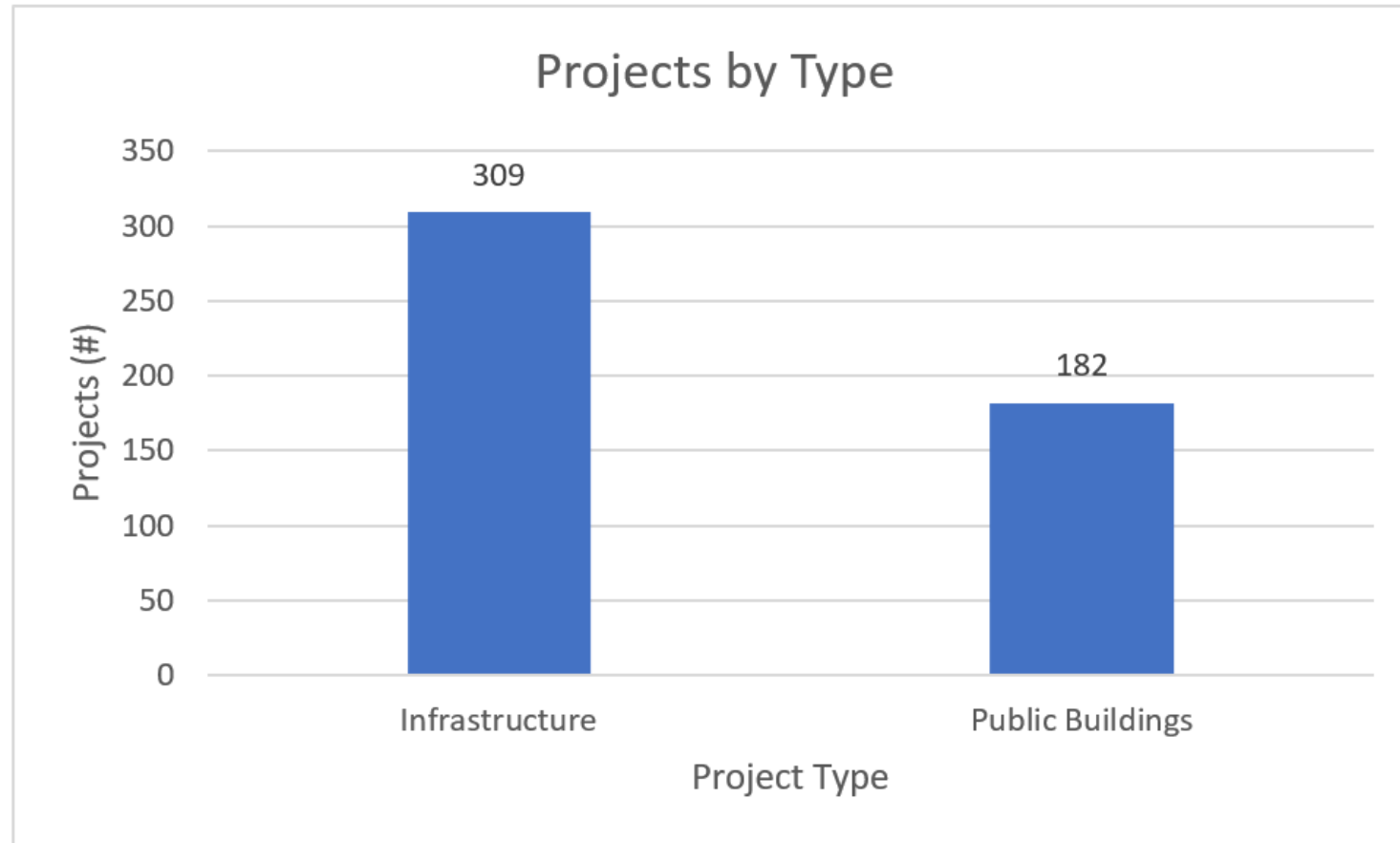
Initial Dependent Variables

1. Estimate/Bid Differential Value
 - a. Interpreted as Difference%
2. Percentage Cost Increase Value
 - a. Calculated as $\text{Change Order Total} / \text{CntrctOrigRegAmt}$
 - b. Created above Change Order Total as sum of PkgRegAmt for each project
3. Percentage Delay Value
 - a) Calculated as $(\text{Actual Duration} - \text{Original Duration}) / \text{Original Duration}$

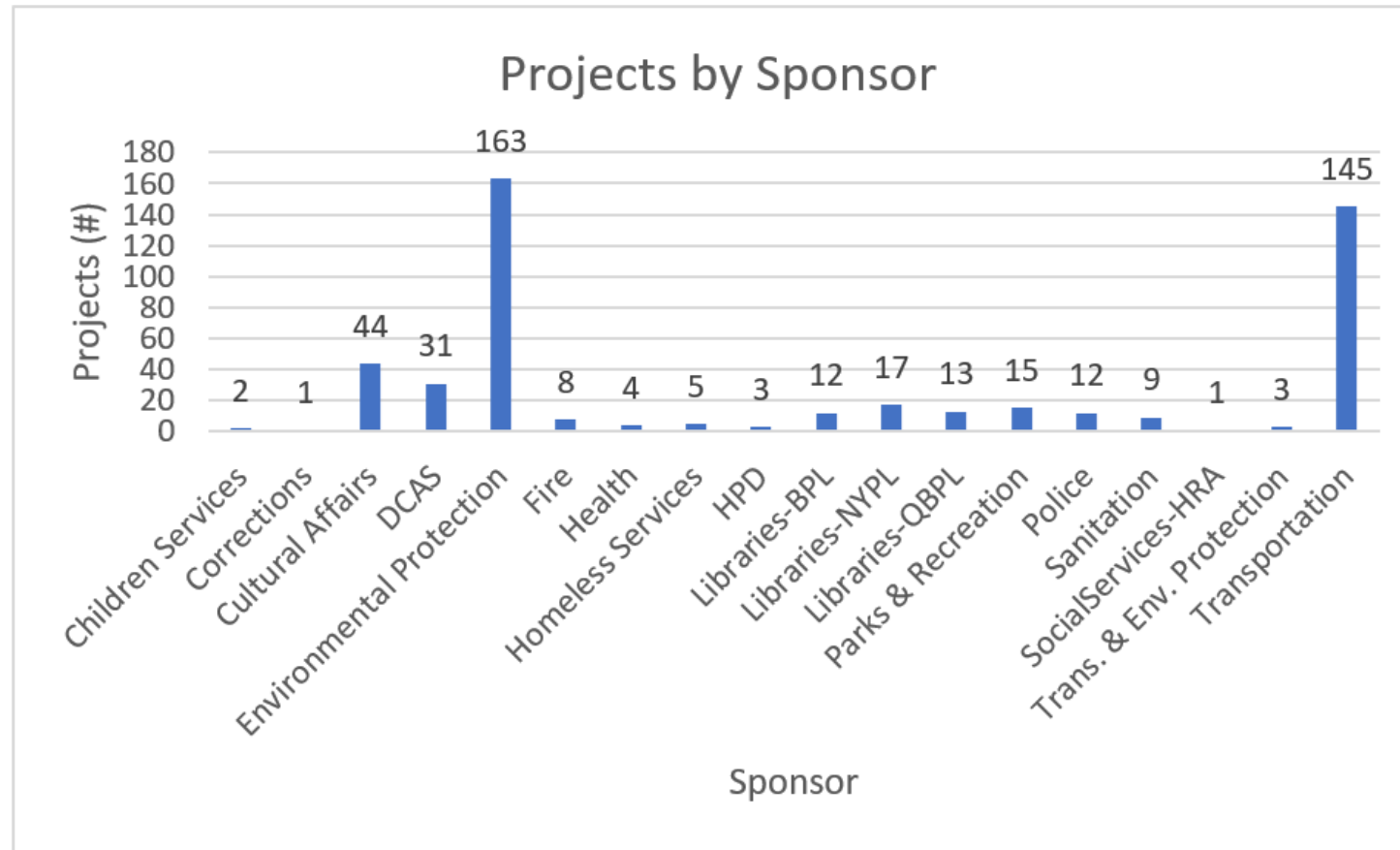
Project 2 Task 2

Descriptive Statistics

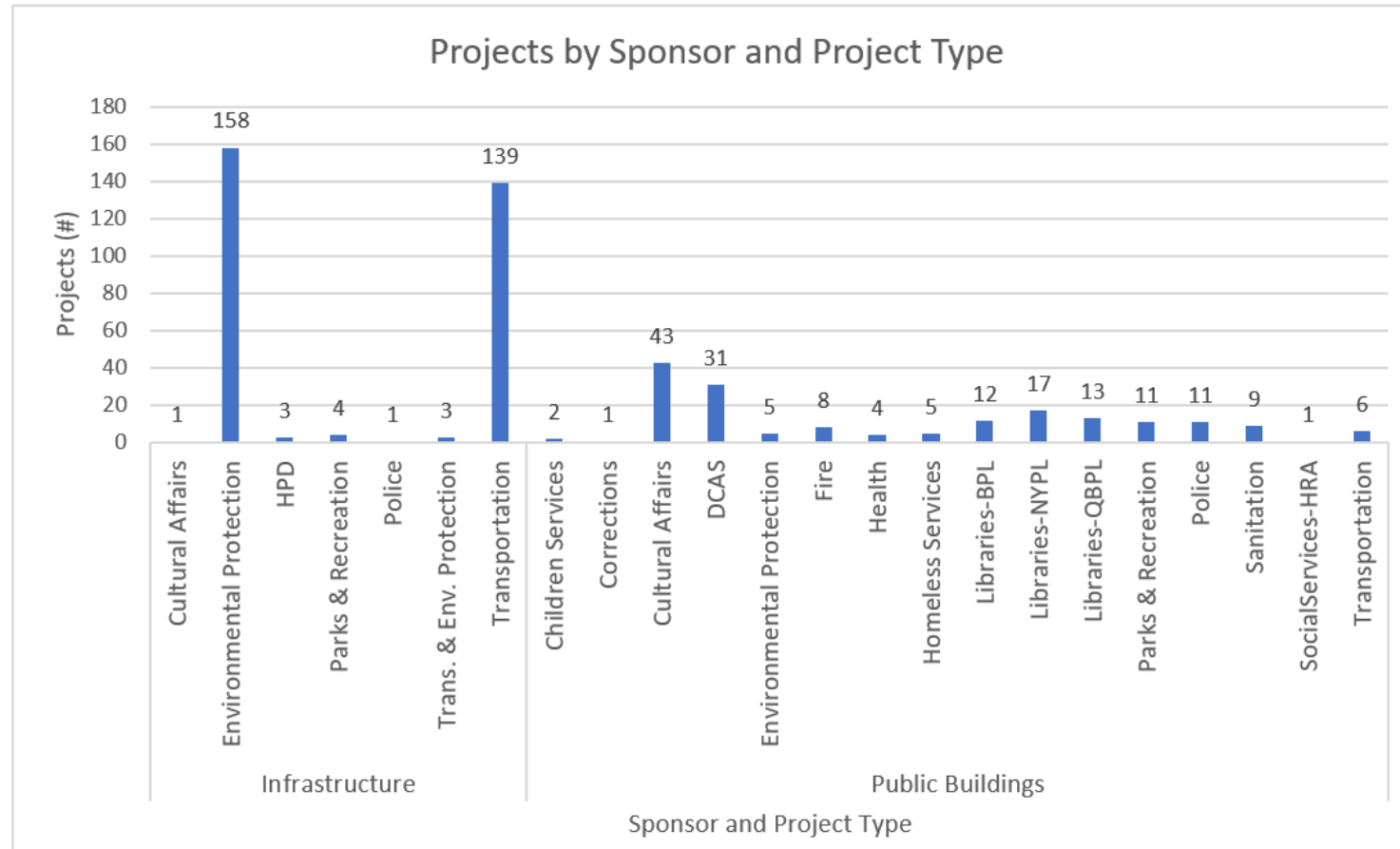
Projects by Type (491 Total Projects)



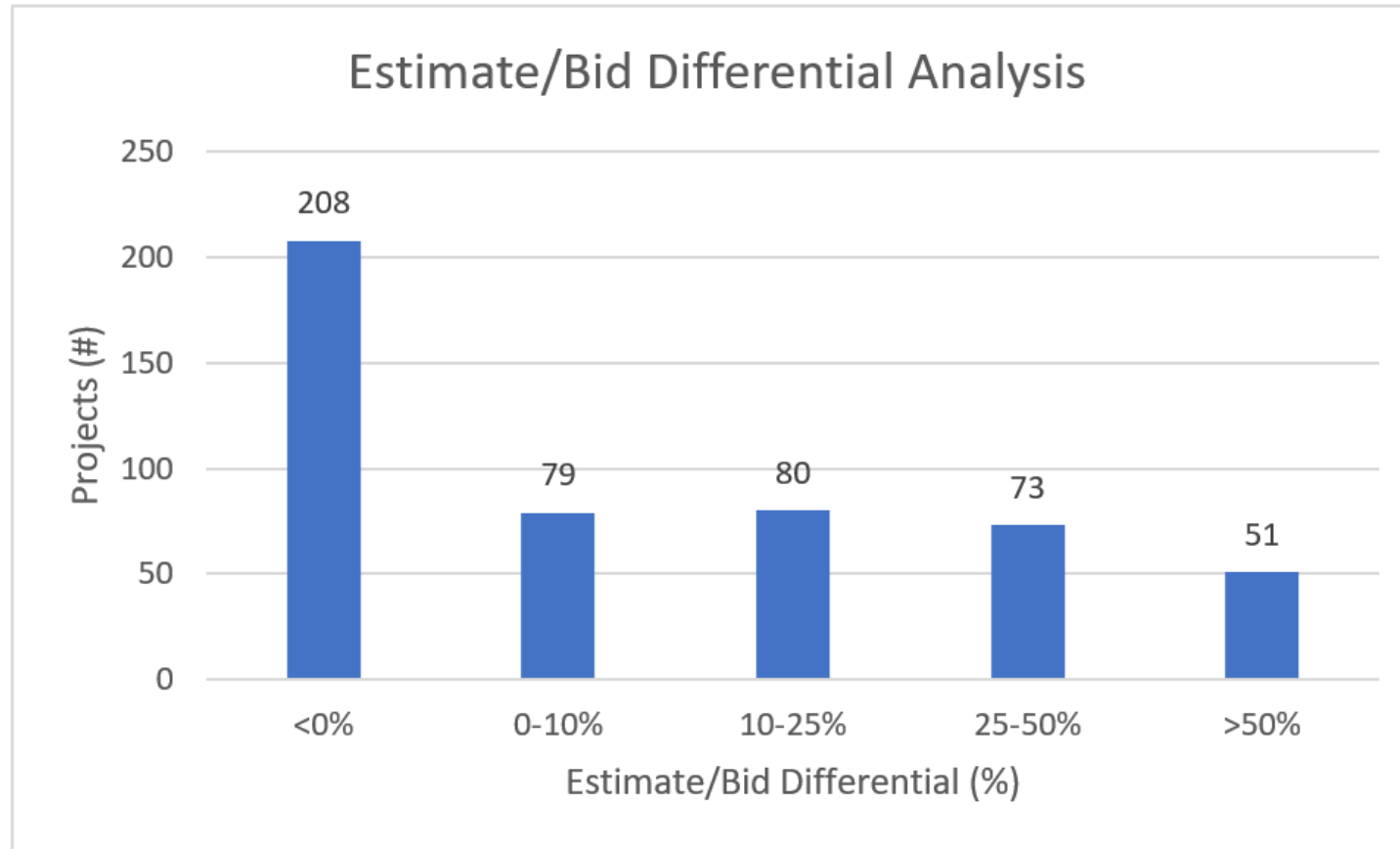
Projects by Sponsor



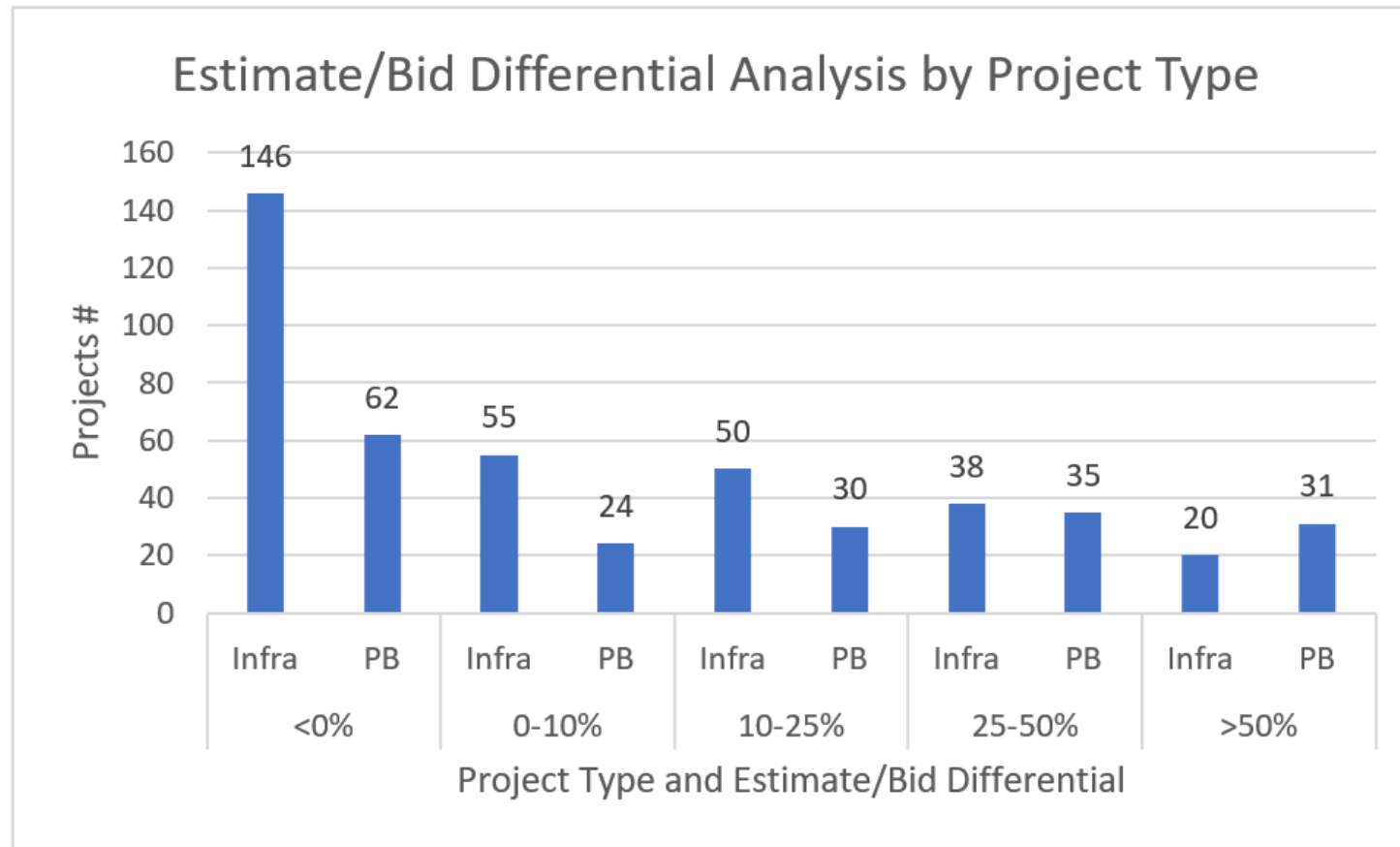
Projects by Sponsor + Type



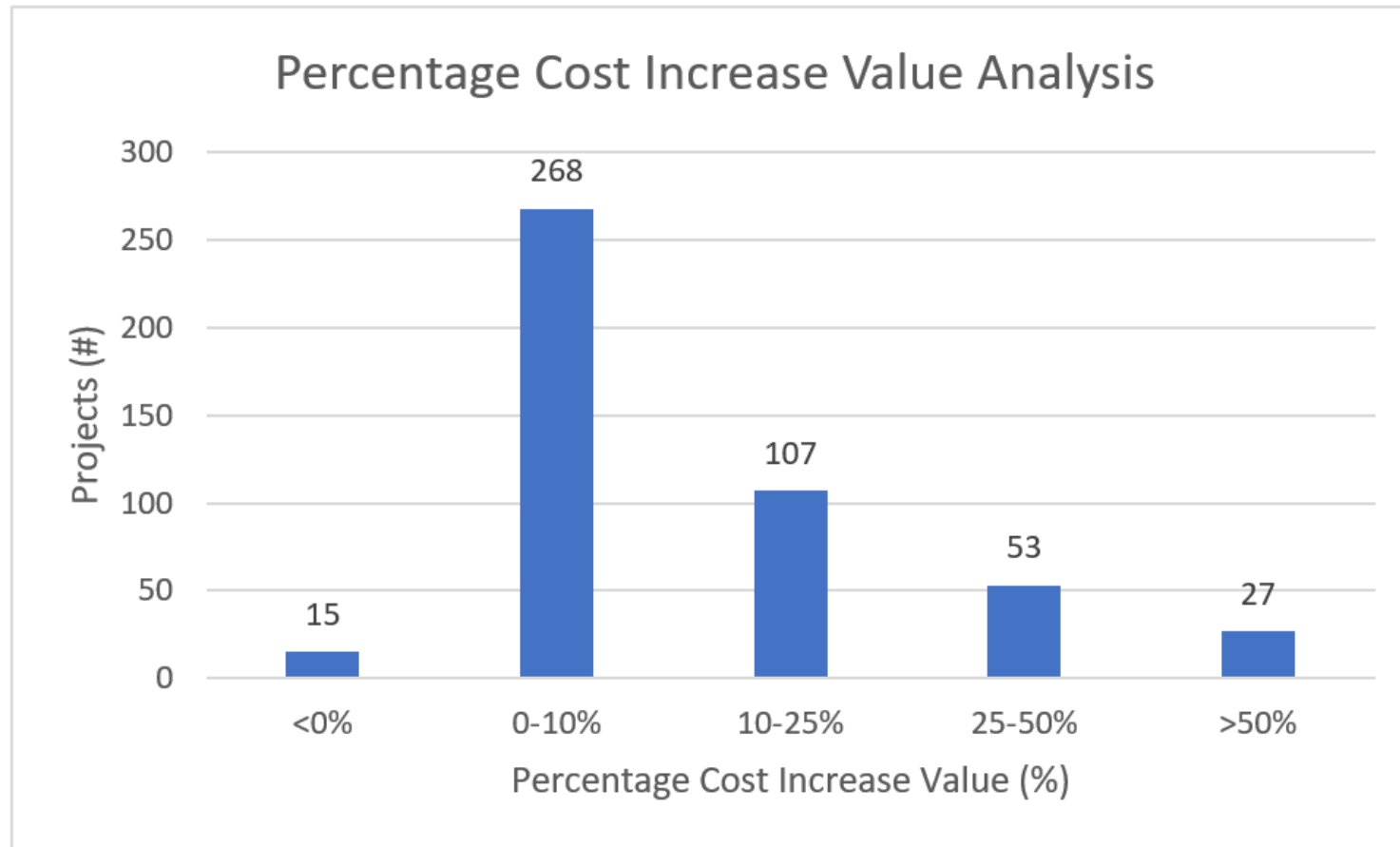
Estimate/Bid Differential Analysis



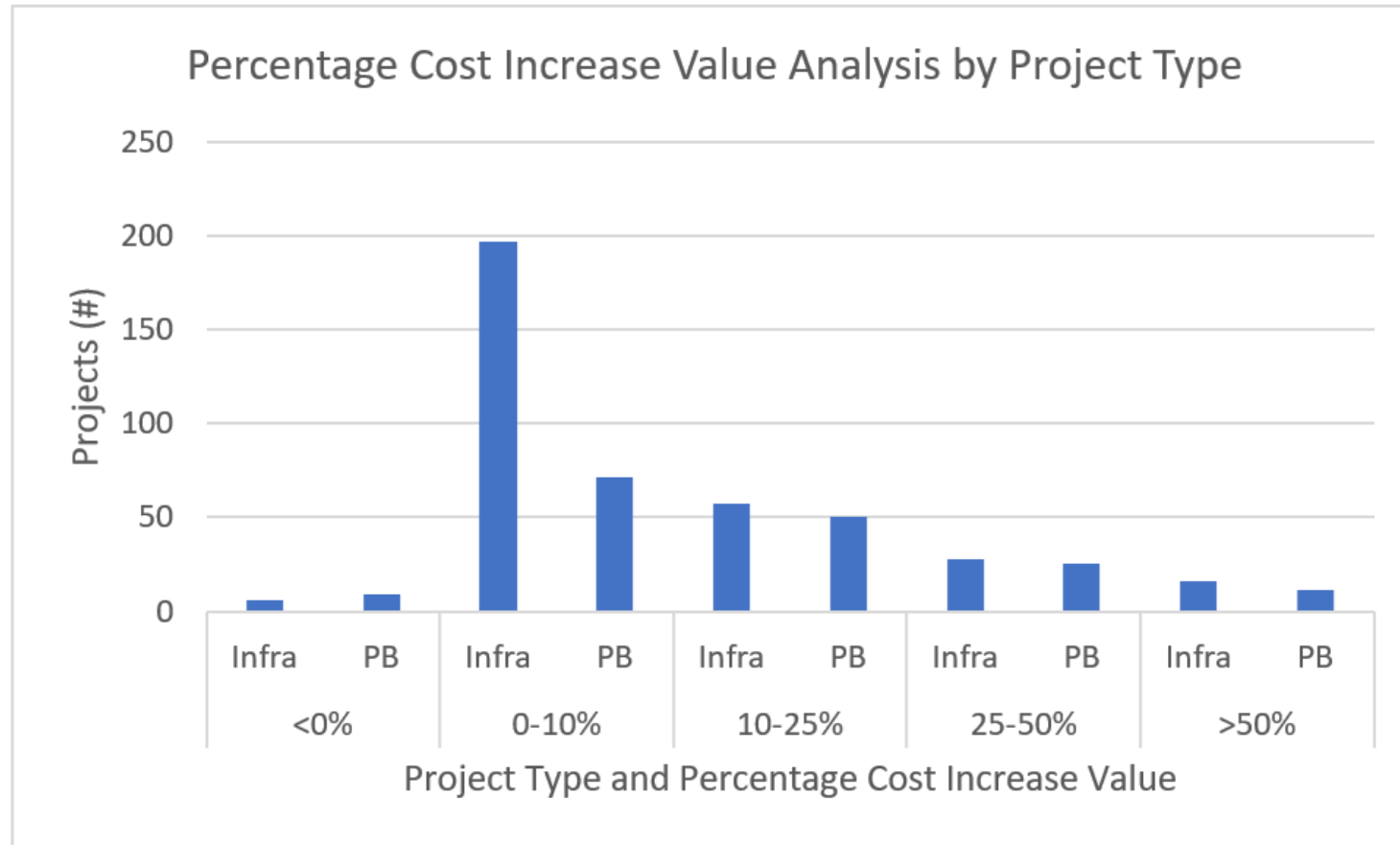
Estimate/Bid Differential Analysis 2



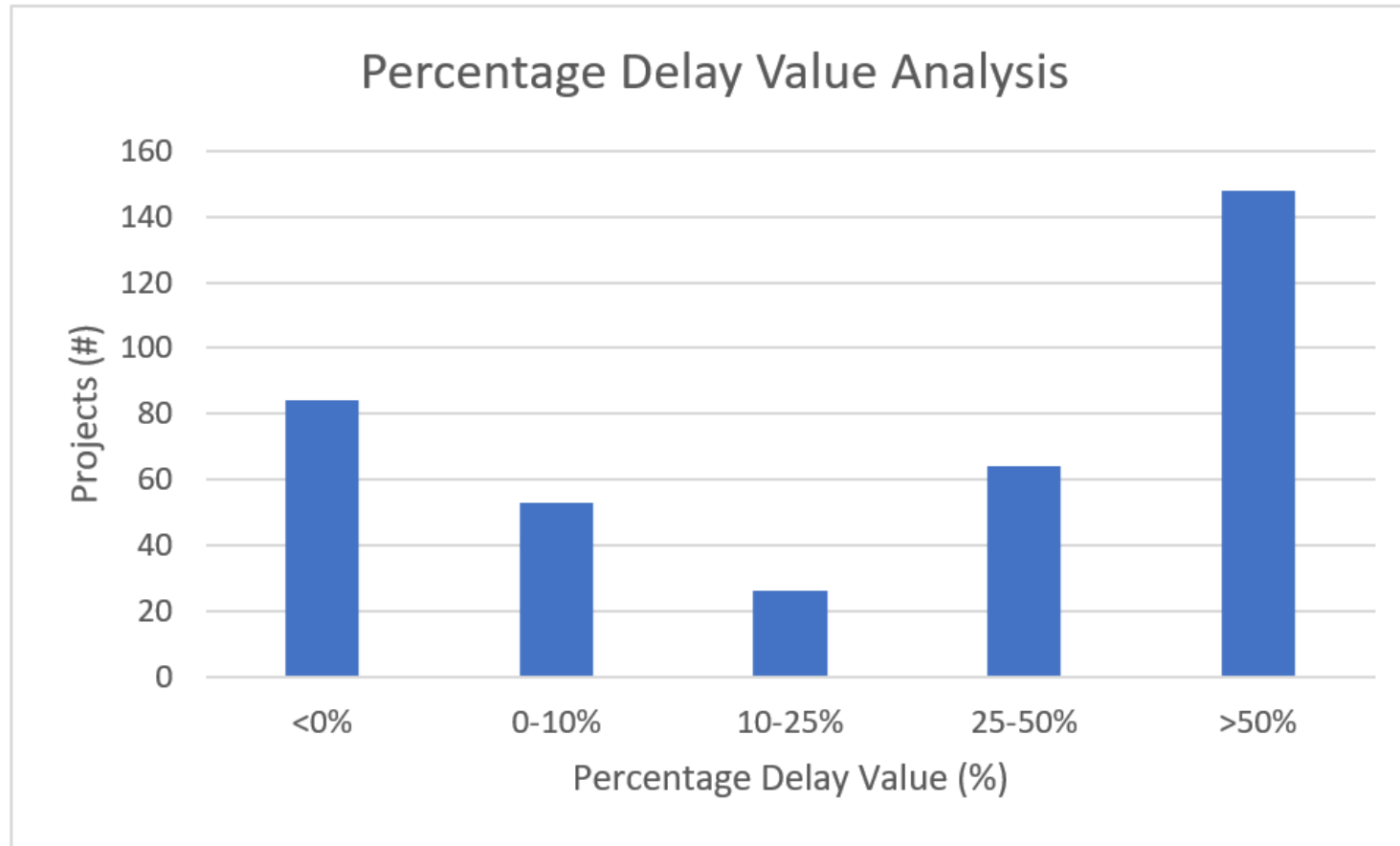
Percentage Cost Increase Value Analysis



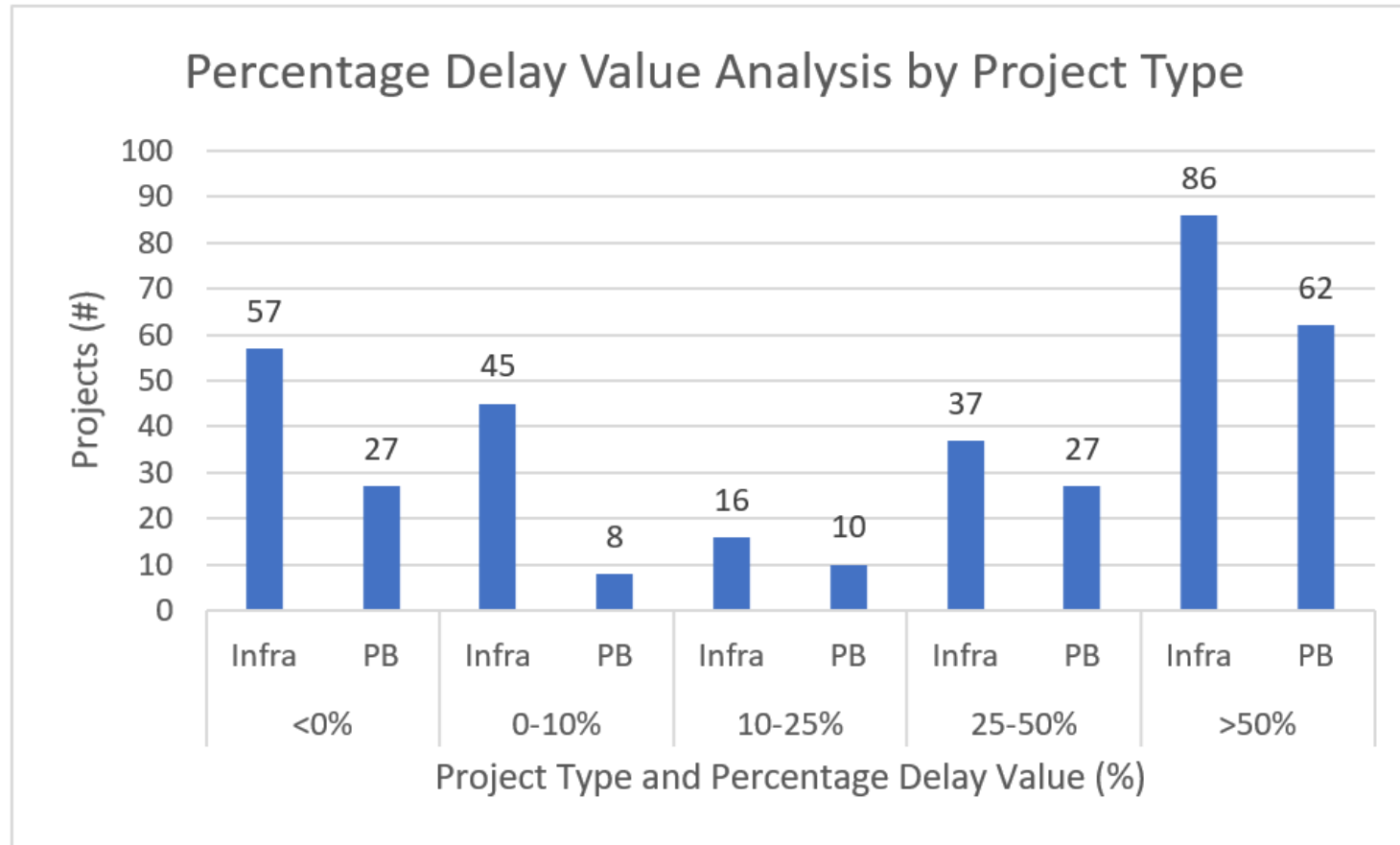
Percentage Cost Increase Value Analysis 2



Percentage Delay Value Analysis



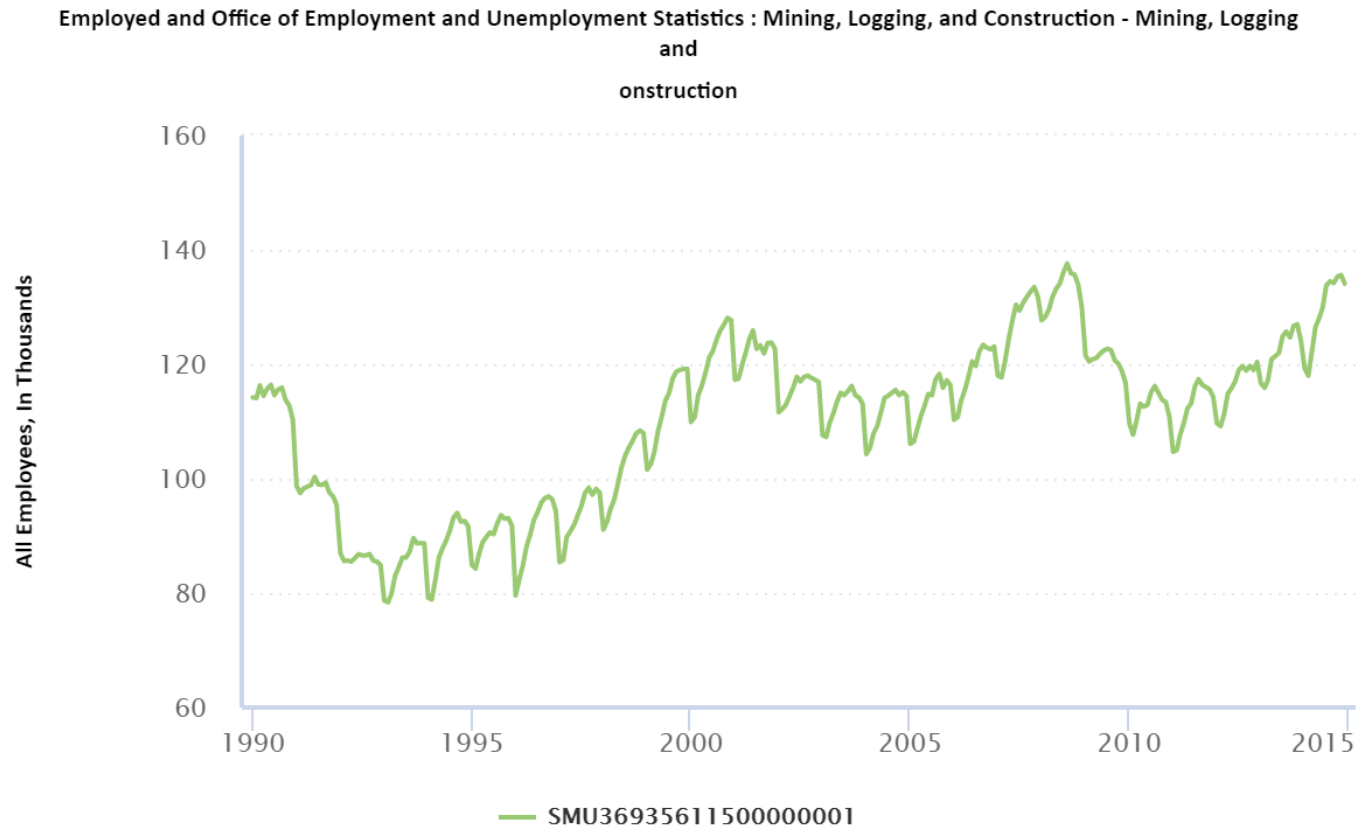
Percentage Delay Value Analysis 2



Project 2 Task 3

Identifying Economic Condition Variables for
Correlation and Regression Analyses

NYC Monthly Construction Employment



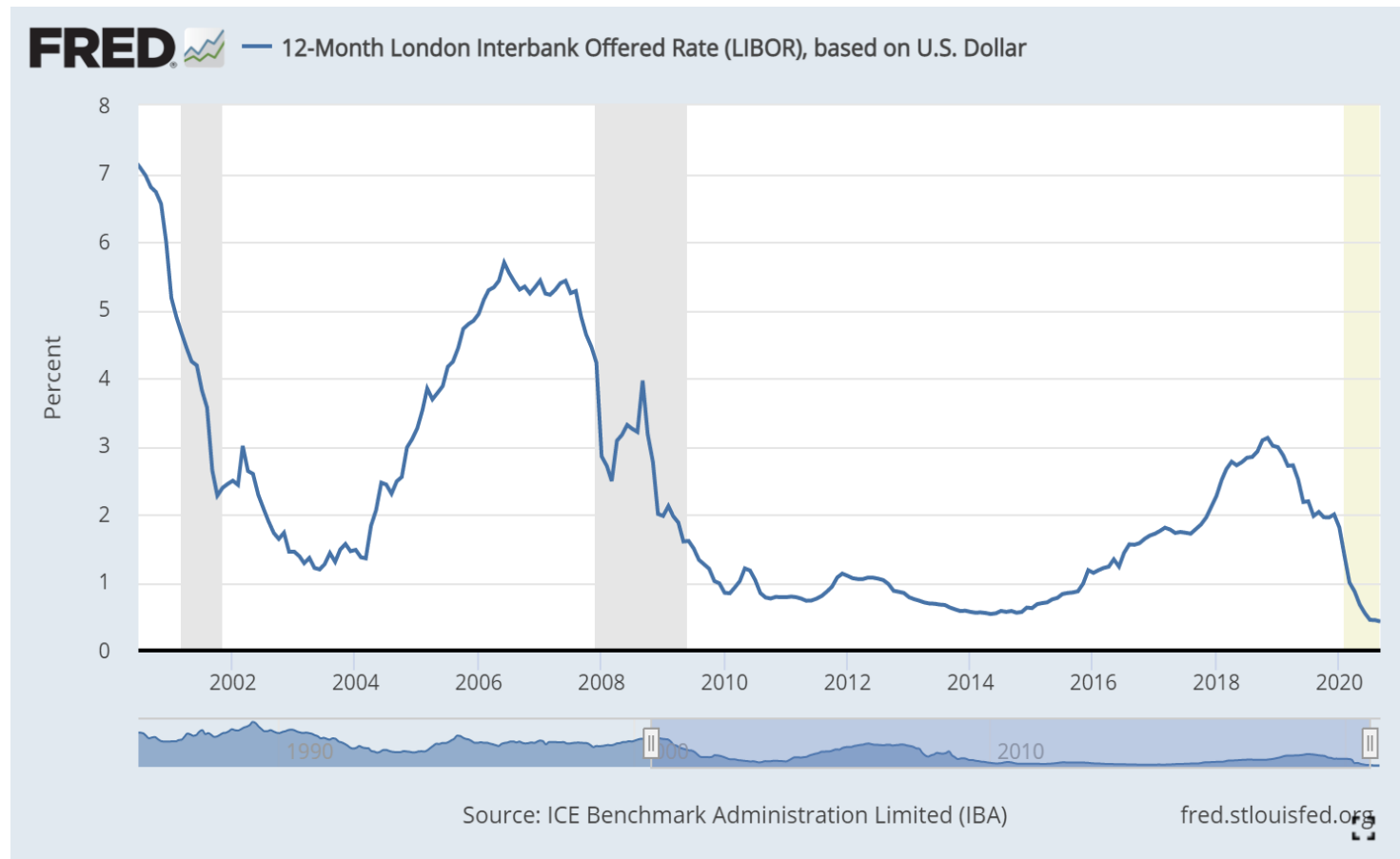
- Calculated as the Percent Monthly Change in Employment

Click and drag in the plot area to zoom in. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics.



Source: [U.S. Bureau of Labor Statistics](https://www.bls.gov)

LIBOR Rates (12 Month, USD)



- Calculated as the Percent Monthly Change in the monthly average LIBOR Rates

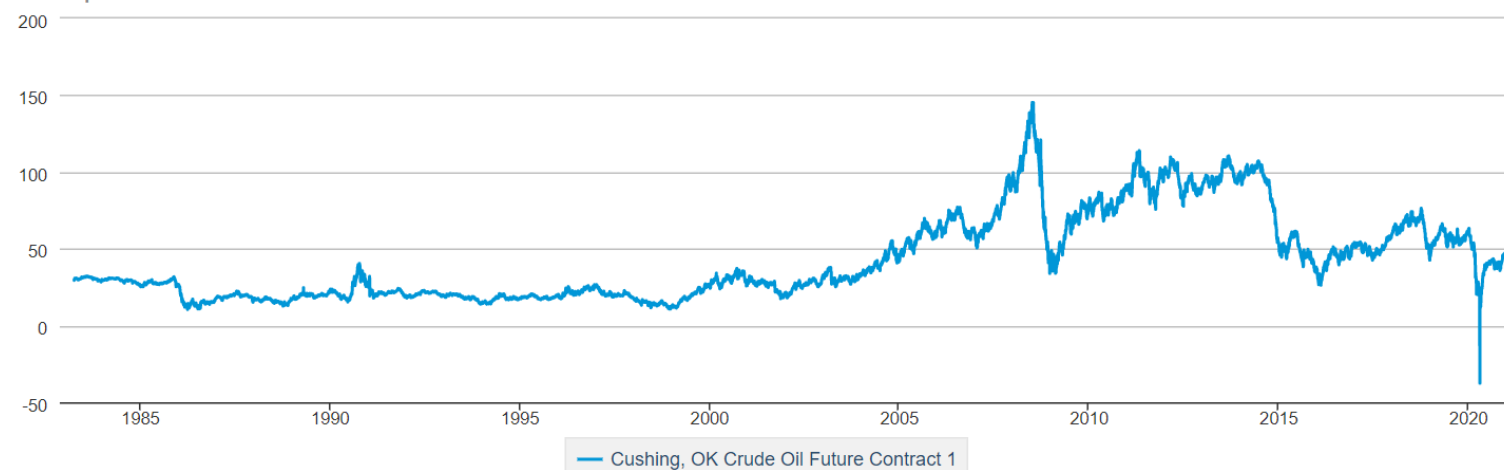
Source: [Federal Reserve Bank of St. Louis](https://www.federalreservebankofstlouis.org/)

Crude Oil (USD/Barrel)

Cushing, OK Crude Oil Future Contract 1

DOWNLOAD

Dollars per Barrel



- Calculated as the Percent Monthly Change in the monthly average Crude Oil Rates

Source: [U.S. Energy Information Administration](#)

Creation of 2 sets of Economic Conditions

Pre-bid Economic Conditions

are calculated twice:

1. 3 months after the date of “Actual Design Completion” (D3)
2. 6 months after the date of “Actual Design Completion” (D6)

Construction Period Economic Conditions

are calculated twice:

1. 6 months after the date of “Actual Construction Start” (C6)
2. 12 months after the date of “Actual Construction Start” (C12)

Therefore, percent monthly changes in Employment, LIBOR, and Crude Oil were calculated for each of these four dates for use in Correlation and Regression Analyses.

Project 2 Task 4

Correlations

Correlation Analyses: Overview

There are 2 series of Correlation Analyses:

Series 1: The effect of **Pre-bid Economic Conditions** (2 dates in total: D3, D6) on the Estimate/Bid Differential value

Series 2: The effect of **Pre-bid AND Construction Period Economic Conditions** (4 dates in total: D3, D6, C6, C12) on the Percentage Cost Increase value and Percentage Delay value

Correlation Analysis: Series 1 (D3)

Examining the correlations between **Pre-bid Economic Conditions** (3 months after the date of “Actual Design Completion”) and Estimate/Bid Differential

	<i>Est/Bid Differential</i>	<i>EMPL D3</i>	<i>LIBOR D3</i>	<i>OIL D3</i>
<i>Est/Bid Differential</i>	1.00			
<i>EMPL D3</i>	-0.08	1.00		
<i>LIBOR D3</i>	0.08	-0.07	1.00	
<i>OIL D3</i>	0.07	0.26	-0.05	1.00

Employment: the coefficient of -0.08 shows a weak negative correlation with the Est/Bid Differential

LIBOR: the coefficient of 0.08 shows a weak positive correlation with the Est/Bid Differential

Oil: the coefficient of 0.07 shows a weak positive correlation with the Est/Bid Differential

Correlation Analysis: Series 1 (D6)

Examining the correlations between **Pre-bid Economic Conditions** (6 months after the date of “Actual Design Completion”) and Estimate/Bid Differential

	<i>Est/Bid Differential</i>	<i>EMPL D6</i>	<i>LIBOR D6</i>	<i>OIL D6</i>
<i>Est/Bid Differential</i>	1.00			
<i>EMPL D6</i>	0.02	1.00		
<i>LIBOR D6</i>	0.12	-0.10	1.00	
<i>OIL D6</i>	-0.11	0.23	-0.20	1.00

Employment: the coefficient of 0.02 shows a weak positive correlation with the Est/Bid Differential

LIBOR: the coefficient of 0.12 shows a weak positive correlation with the Est/Bid Differential

Oil: the coefficient of -0.11 shows a weak negative correlation with the Est/Bid Differential

Correlation Analysis: Series 2 (D3)

Examining the correlations between **Pre-bid Economic Conditions** (3 months after the date of “Actual Design Completion”) and Percentage Cost Increase & Percentage Delay

	<i>Percentage Cost Increase</i>	<i>Percentage Delay</i>	<i>EMPL D3</i>	<i>LIBOR D3</i>	<i>OIL D3</i>
Percentage Cost Increase	1.00				
Percentage Delay	0.35	1.00			
EMPL D3	0.03	0.06	1.00		
LIBOR D3	-0.01	-0.14	-0.07	1.00	
OIL D3	-0.01	-0.05	0.26	-0.05	1.00

Percentage Cost Increase

Employment: the coefficient of 0.03 shows a weak positive correlation

LIBOR: the coefficient of -0.01 shows a weak negative correlation

Oil: the coefficient of -0.01 shows a weak negative correlation

Percentage Delay

Employment: the coefficient of 0.06 shows a weak positive correlation

LIBOR: the coefficient of -0.14 shows a weak negative correlation

Oil: the coefficient of -0.05 shows a weak negative correlation

Correlation Analysis: Series 2 (D6)

Examining the correlations between **Pre-bid Economic Conditions** (6 months after the date of “Actual Design Completion”) and Percentage Cost Increase & Percentage Delay

	<i>Percentage Cost Increase</i>	<i>Percentage Delay</i>	<i>EMPL D6</i>	<i>LIBOR D6</i>	<i>OIL D6</i>
Percentage Cost Increase	1.00				
Percentage Delay	0.35	1.00			
EMPL D6	0.03	-0.08	1.00		
LIBOR D6	-0.05	-0.08	-0.10	1.00	
OIL D6	-0.03	0.03	0.23	-0.20	1.00

Percentage Cost Increase

Employment: the coefficient of 0.03 shows a weak positive correlation

LIBOR: the coefficient of -0.05 shows a weak negative correlation

Oil: the coefficient of -0.03 shows a weak negative correlation

Percentage Delay

Employment: the coefficient of -0.08 shows a weak negative correlation

LIBOR: the coefficient of -0.08 shows a weak negative correlation

Oil: the coefficient of 0.03 shows a weak positive correlation

Correlation Analysis: Series 2 (C6)

Examining the correlations between **Construction Period Economic Conditions** (6 months after the date of “Actual Construction Start”) and Percentage Cost Increase & Percentage Delay

	<i>Percentage Cost Increase</i>	<i>Percentage Delay</i>	<i>EMPL C6</i>	<i>LIBOR C6</i>	<i>OIL C6</i>
Percentage Cost Increase	1.00				
Percentage Delay	0.35	1.00			
EMPL C6	0.07	0.05	1.00		
LIBOR C6	0.00	0.00	-0.12	1.00	
OIL C6	-0.02	0.02	0.24	-0.04	1.00

Percentage Cost Increase

Employment: the coefficient of 0.07 shows a weak positive correlation

LIBOR: the coefficient of 0.00 shows no correlation

Oil: the coefficient of -0.02 shows a weak negative correlation

Percentage Delay

Employment: the coefficient of 0.05 shows a weak positive correlation

LIBOR: the coefficient of 0.00 shows no correlation

Oil: the coefficient of 0.02 shows a weak positive correlation

Correlation Analysis: Series 2 (C12)

Examining the correlations between **Construction Period Economic Conditions** (12 months after the date of “Actual Construction Start”) and Percentage Cost Increase & Percentage Delay

	<i>Percentage Cost Increase</i>	<i>Percentage Delay</i>	<i>EMPL C12</i>	<i>LIBOR C12</i>	<i>OIL C12</i>
Percentage Cost Increase	1.00				
Percentage Delay	0.35	1.00			
EMPL C12	-0.04	0.06	1.00		
LIBOR C12	0.04	0.04	-0.31	1.00	
OIL C12	-0.08	0.02	0.51	-0.18	1.00

Percentage Cost Increase

Employment: the coefficient of -0.04 shows a weak negative correlation

LIBOR: the coefficient of 0.04 shows a weak positive correlation

Oil: the coefficient of -0.08 shows a weak negative correlation

Percentage Delay

Employment: the coefficient of 0.06 shows a weak positive correlation

LIBOR: the coefficient of 0.04 shows a weak positive correlation

Oil: the coefficient of 0.02 shows a weak positive correlation

Correlation Analysis: Findings

<i>Estimate/Bid Differential</i>	Positive Correlation (#)	Negative Correlation (#)
Employment	1	1
LIBOR	2	0
Oil	1	1
<i>Percentage Cost Increase</i>	Positive Correlation (#)	Negative Correlation (#)
Employment	3	1
LIBOR	2	2
Oil	0	4
<i>Percentage Delay</i>	Positive Correlation (#)	Negative Correlation (#)
Employment	3	1
LIBOR	2	2
Oil	3	1

There are interesting trends, as shown by the number of positive and negative correlations for the economic conditions across both Series 1 (pre-bid) and Series 2 (construction period). They include:

- Series 1: 2 of 2 correlations showed that as **LIBOR** increases, so does Est/Bid Differential
- Series 2: 3 of 4 correlations showed that as **Employment** increases, so does Percentage Cost Increase
- Series 2: 4 of 4 correlations showed that as **Oil** increases, Percentage Cost Increase decreases
- Series 2: 3 of 4 correlations showed that as **Employment** increases, so does Percentage Delay
- Series 2: 3 of 4 correlations showed that as **Oil** increases, so does Percentage Delay

Project 2 Task 5

Regressions

Regression Analyses: Overview

There are 2 series of Regression Analyses (same as the Correlations):

Series 1: The effect of **Pre-bid Economic Conditions** (2 dates in total: D3, D6) on the Estimate/Bid Differential value

Series 2: The effect of **Pre-bid AND Construction Period Economic Conditions** (4 dates in total: D3, D6 C6, C12) on the Percentage Cost Increase value and Percentage Delay value

Regression Analysis: Series 1 (D3 + D6)

Pre-Bid Economic Conditions
(3 months after the date of “Actual Design Completion”) on Est/Bid Differential

Regression Statistics	
Multiple R	0.15
R Square	0.02
Adjusted R Square	0.01
Standard Error	0.33
Observations	371

R Square: 2% of our values fit the regression analysis model

P-Value of Independent Variables: one statistically significant value (employment)

Multiple Regression Equation: $y = -0.02 * \text{Employment} + 0.54 * \text{LIBOR} + 0.36 * \text{Oil} + 0.08$

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.08	0.02	4.20	0.00	0.04	0.12	0.04	0.12
EMPL D3	-0.02	0.01	-1.94	0.05	-0.04	0.00	-0.04	0.00
LIBOR D3	0.54	0.35	1.53	0.13	-0.15	1.23	-0.15	1.23
OIL D3	0.36	0.19	1.92	0.06	-0.01	0.74	-0.01	0.74

Pre-Bid Economic Conditions
(6 months after the date of “Actual Design Completion”) on Est/Bid Differential

Regression Statistics	
Multiple R	0.16
R Square	0.02
Adjusted R Square	0.02
Standard Error	0.33
Observations	371

R Square: 2% of our values fit the regression analysis model

P-Value of Independent Variable: one statistically significant value (LIBOR)

Multiple Regression Equation: $y = 0.01 * \text{Employment} + 0.71 * \text{LIBOR} - 0.40 * \text{Oil} + 0.06$

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.06	0.02	3.23	0.00	0.02	0.10	0.02	0.10
EMPL D6	0.01	0.01	0.95	0.34	-0.01	0.03	-0.01	0.03
LIBOR D6	0.71	0.36	1.96	0.05	0.00	1.43	0.00	1.43
OIL D6	-0.40	0.21	-1.90	0.06	-0.82	0.01	-0.82	0.01

Regression Analysis: Series 2 (D3)

Pre-Bid Economic Conditions
 (3 months after the date of “Actual Design Completion”) on Percentage Cost Increase

Regression Statistics	
Multiple R	0.04
R Square	0.00
Adjusted R Square	-0.01
Standard Error	0.29
Observations	371

R Square: 0% of our values fit the regression analysis model

P-Value of Independent Variables: no statistically significant values

Multiple Regression Equation: $y = 0.01 * \text{Employment} - 0.04 * \text{LIBOR} - 0.07 * \text{Oil} + 0.16$

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.16	0.02	9.48	0.00	0.13	0.20	0.13	0.20
EMPL D3	0.01	0.01	0.67	0.51	-0.01	0.02	-0.01	0.02
LIBOR D3	-0.04	0.30	-0.12	0.90	-0.64	0.56	-0.64	0.56
OIL D3	-0.07	0.16	-0.40	0.69	-0.39	0.26	-0.39	0.26

Pre-Bid Economic Conditions
 (3 months after the date of “Actual Design Completion”) on Percentage Delay

Regression Statistics	
Multiple R	0.16
R Square	0.03
Adjusted R Square	0.02
Standard Error	0.75
Observations	371

R Square: 3% of our values fit the regression analysis model

P-Value of Independent Variable: one statistically significant value (LIBOR)

Multiple Regression Equation: $y = 0.03 * \text{Employment} - 2.16 * \text{LIBOR} - 0.59 * \text{Oil} + 0.54$

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.54	0.04	12.13	0.00	0.45	0.63	0.45	0.63
EMPL D3	0.03	0.02	1.24	0.22	-0.02	0.07	-0.02	0.07
LIBOR D3	-2.16	0.80	-2.71	0.01	-3.72	-0.59	-3.72	-0.59
OIL D3	-0.59	0.43	-1.38	0.17	-1.44	0.25	-1.44	0.25

Regression Analysis: Series 2 (D6)

Pre-Bid Economic Conditions
 (6 months after the date of “Actual Design Completion”) on Percentage Cost Increase

Regression Statistics	
Multiple R	0.09
R Square	0.01
Adjusted R Square	0.00
Standard Error	0.29
Observations	371

R Square: 1% of our values fit the regression analysis model

P-Value of Independent Variables: no statistically significant values

Multiple Regression Equation: $y = 0.01 * \text{Employment} + 0.05 * \text{LIBOR} - 0.15 * \text{Oil} + 0.16$

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.16	0.02	9.48	0.00	0.13	0.19	0.13	0.19
EMPL D6	0.01	0.01	1.58	0.11	0.00	0.03	0.00	0.03
LIBOR D6	0.05	0.30	0.16	0.87	-0.55	0.64	-0.55	0.64
OIL D6	-0.15	0.17	-0.85	0.40	-0.49	0.19	-0.49	0.19

Pre-Bid Economic Conditions
 (6 months after the date of “Actual Design Completion”) on Percentage Delay

Regression Statistics	
Multiple R	0.05
R Square	0.00
Adjusted R Square	-0.01
Standard Error	0.76
Observations	371

R Square: 0% of our values fit the regression analysis model

P-Value of Independent Variable: no statistically significant values

Multiple Regression Equation: $y = 0.02 * \text{Employment} + 0.06 * \text{LIBOR} + 0.02 * \text{Oil} + 0.50$

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.50	0.04	11.21	0.00	0.41	0.58	0.41	0.58
EMPL D6	0.02	0.02	1.01	0.31	-0.02	0.07	-0.02	0.07
LIBOR D6	0.06	0.80	0.07	0.94	-1.51	1.63	-1.51	1.63
OIL D6	0.02	0.46	0.04	0.97	-0.88	0.92	-0.88	0.92

Regression Analysis: Series 2 (C6)

Construction Period Economic Conditions
(6 months after the date of “Actual Construction Start”) on Percentage Cost Increase

R Square: 1% of our values fit the regression analysis model

P-Value of Independent Variables: no statistically significant values

Multiple Regression Equation: $y = 0.01 * \text{Employment} + 0.05 * \text{LIBOR} - 0.15 * \text{Oil} + 0.16$

Regression Statistics	
Multiple R	0.09
R Square	0.01
Adjusted R Square	0.00
Standard Error	0.29
Observations	371

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.16	0.02	9.48	0.00	0.13	0.19	0.13	0.19
EMPL C6	0.01	0.01	1.58	0.11	0.00	0.03	0.00	0.03
LIBOR C6	0.05	0.30	0.16	0.87	-0.55	0.64	-0.55	0.64
OIL C6	-0.15	0.17	-0.85	0.40	-0.49	0.19	-0.49	0.19

Construction Period Economic Conditions
(6 months after the date of “Actual Construction Start”) on Percentage Delay

R Square: 0% of our values fit the regression analysis model

P-Value of Independent Variable: no statistically significant values

Multiple Regression Equation: $y = 0.06 * \text{Employment} + 0.02 * \text{LIBOR} + 0.02 * \text{Oil} + 0.50$

Regression Statistics	
Multiple R	0.05
R Square	0.00
Adjusted R Square	-0.01
Standard Error	0.76
Observations	371

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.50	0.04	11.21	0.00	0.41	0.58	0.41	0.58
EMPL C6	0.06	0.80	0.07	0.94	-1.51	1.63	-1.51	1.63
LIBOR C6	0.02	0.02	1.01	0.31	-0.02	0.07	-0.02	0.07
OIL C6	0.02	0.46	0.04	0.97	-0.88	0.92	-0.88	0.92

Regression Analysis: Series 2 (C12)

Construction Period Economic Conditions (12 months after the date of “Actual Construction Start”) on Percentage Cost Increase

R Square: 1% of our values fit the regression analysis model

P-Value of Independent Variables: no statistically significant values

Multiple Regression Equation: $y = 0.00 \cdot \text{Employment} + 0.14 \cdot \text{LIBOR} - 0.24 \cdot \text{Oil} + 0.16$

Regression Statistics	
Multiple R	0.08
R Square	0.01
Adjusted R Square	0.00
Standard Error	0.29
Observations	371

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.16	0.02	9.98	0.00	0.13	0.20	0.13	0.20
EMPL C12	0.00	0.01	0.20	0.84	-0.01	0.01	-0.01	0.01
LIBOR C12	0.14	0.31	0.46	0.65	-0.46	0.74	-0.46	0.74
OIL C12	-0.24	0.17	-1.37	0.17	-0.58	0.10	-0.58	0.10

Construction Period Economic Conditions (12 months after the date of “Actual Construction Start”) on Percentage Delay

R Square: 1% of our values fit the regression analysis model

P-Value of Independent Variable: no statistically significant values

Multiple Regression Equation: $y = 0.02 \cdot \text{Employment} + 0.92 \cdot \text{LIBOR} - 0.15 \cdot \text{Oil} + 0.48$

Regression Statistics	
Multiple R	0.09
R Square	0.01
Adjusted R Square	0.00
Standard Error	0.76
Observations	371

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.48	0.04	11.07	0.00	0.40	0.57	0.40	0.57
EMPL C12	0.02	0.01	1.46	0.15	-0.01	0.05	-0.01	0.05
LIBOR C12	0.92	0.81	1.14	0.26	-0.67	2.51	-0.67	2.51
OIL C12	-0.15	0.46	-0.32	0.75	-1.06	0.76	-1.06	0.76

Regression Analysis: Findings

- Regressions for Series 1 each had a statistically significant coefficient
 - Employment for D3 (coefficient of -0.02): as employment increases, Est/Bid Differential tends to decrease
 - LIBOR for D6 (coefficient of 0.71): as LIBOR increases, Est/Bid Differential tends to increase
- Regression for Series 2 had a statistically significant coefficient for the D3 Percentage Delay Regression
 - LIBOR (coefficient -2.16): as LIBOR increases, Percentage Delay tends to decrease
- Overall, Series 1 (**Pre-bid Economic Conditions** and Est/Bid Differential) Regressions had lower and more statistically significant p-values.